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OCCUPATIONAL HAZARD ANALYSIS
BUILDING T4002
FORT DRUM, NEW YORK

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

#787

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MISCELLANEOUS MILITARY AND CIVIL HAZARDOUS WASTE CLEANUP PROJECTS FOR U. S. ARMY CORPS OF ENGINEERS KANSAS CITY DISTRICT

OCCUPATIONAL HAZARD ANALYSIS BUILDING T4002 FORT DRUM, NEW YORK

CONTRACT NO. DACW41-89-D-0086
D.O. NO. 024

Prepared By:

CDM FEDERAL PROGRAMS CORPORATION
8215 Melrose Drive, Suite 100
Lenexa, KS 66214

June 1995

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CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

September 8, 1995

Mr. Brian Roberts (CEMRK-EP-EC)
U. S. Army Corps of Engineers
Kansas City District
700 Federal Building
601 East 12th Street
Kansas City, Missouri 64106-2896

Project: Contract No. DACW41-89-D-0086
Delivery Order No. 024 - Building T4002
Subject: Revised Occupational Hazard Analysis Report

Dear Mr. Roberts:

CDM Federal Programs Corporation (CDM Federal) is pleased to submit two copies of the revised Occupational Hazard Analysis Report for Building T4002, Fort Drum, New York. This report has been revised to correct several editorial errors in the previous version.

If you have any questions, please contact me at (913) 492-8181.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION

Jacqueline M. Mosher

Jacqueline M. Mosher, P.E.
Project Manager

Enclosure

cc: J. Haynes, Fort Drum - 10 copies
R. Myerson, WOHA - 1 copy
C. Myers
7801-034-RT
RF

JMM3.98

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June 1995

Prepared by: _____ Date: 6/12/95
Ross S. Myerson, M.D., M.D.H.
Washington Occupational Health Associates, Inc.

Reviewed by: _____ Date: 6/27/95
Charles Myers, CIH
CDM Federal

Approved by: Jackie M. Mosher Date: 6/30/95
Jackie M. Mosher, P.E.
CDM Federal Project Manager

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POTENTIAL TOXICOLOGICAL IMPACT OF EXPOSURES ON WORKERS AT BUILDING T4002, FORT DRUM, NY

by Ross S. Myerson, M.D., M.P.H.

Executive Summary

Building T4002 is a wooden-framed structure with steel siding, built in the 1940s. The western room of the building was used as a storage and mixing area for the Pest Controller on Fort Drum. The building is scheduled for demolition in early 1996. In 1989 and 1994, building material samples were collected and found to be contaminated with pesticides and herbicides. Contamination was throughout the building. Employees who occupied the east end of the building have expressed concern at potential exposures from the pesticide and herbicide contamination. To address their concerns, Fort Drum requested that an evaluation of the potential health hazards associated with working in the building be conducted.

CDM Federal Programs Corporation (CDM Federal) was tasked by the U.S. Army Corps of Engineers, Kansas City District, to identify and interview potential employees who may have occupied the building since it was used as a pesticide storage and mixing area; collect air samples to evaluate existing contamination; evaluate existing building conditions; obtain the services of a board-certified occupational physician to determine any health hazard potential; and prepare and present a report outlining results of the investigation.

Washington Occupational Health Associates, Inc., (WOHA) was tasked by CDM Federal to conduct a study of individuals who were concerned that they had been exposed to organochlorine pesticides (DDD, DDE, DDT) and chlorophenoxy herbicides (2,4-D, 2,4,5-T) while working at Building T4002. The concern was that this potential exposure may have adversely affected their health. Our occupational and environmental health professionals reviewed exposure data and medical records and interviewed 17 of the concerned individuals. Based on these data, it is our opinion that there were no long-term health consequences from the potential exposures.

Potential Acute and Chronic Effects of Chlorophenoxy Herbicides (2,4-D, 2,4,5-T) and Organochlorine Pesticides

The potential effects of each contaminant group were reviewed to determine the potential toxicological impact to workers at Building T4002. These effects are discussed below.

Chlorophenoxy Herbicides (2,4-D, 2,4,5-T) - The acute, or short term, effects of exposures to these types of materials include skin, mucus membrane and respiratory tract irritation. Most incidences of acute poisoning with this class of compounds occurs with intentional ingestion of 2,4-D. Symptoms include vomiting, chest and abdominal pain, diarrhea, headache, mental confusion and behavioral abnormalities. Unconsciousness with metabolic disturbances can occur. Mild transient kidney and liver dysfunction are also sometimes found.

Scandinavian studies have demonstrated increased risks for Hodgkins disease and non-Hodgkins lymphomas associated with exposure to 2,4-D and 2,4,5-T. Studies in the United States have found an increase in non-Hodgkins lymphoma among farmers associated with herbicide (primarily 2,4-D) exposure.

Several studies in animals, models and human population have investigated the reproductive toxicity of phenoxy herbicides. The animal studies demonstrate adverse effects however, human studies have not shown definite evidence of the same. Studies of males occupationally exposed to phenoxy herbicides during manufacturing and spraying have observed no increased birth defects or other reproductive effects.

Organochlorine Pesticides (DDD, DDE, DDT) - Acute organochlorine pesticide effects have included sensory disturbances resulting in lack of coordination, headaches, dizziness, numbness, nausea, vomiting, tremors, convulsions, and mental confusion. Sufficiently high doses can result in seizures leading to coma and respiratory depression.

Acute effects of pesticides have been well studied and understood, however, long term effects have not been as consistent in findings, and are often unclear. Some pesticides have been shown to cause cancer, and adverse reproductive effects in laboratory animals. There is, however, a lack of consistent evidence from epidemiological and clinical studies that these chronic effects have been observed in humans. These human studies have focused on individuals involved with manufacturing and application of pesticides. Some studies have shown small increases in lung cancer mortality for various classes of pesticides.

Organochlorines, including DDT, have been implicated in a variety of adverse reproductive outcomes, however, epidemiologic evidence is tentative.

Interview Process

As part of the overall Occupational Hazard Analysis for Building T4002, it was necessary to identify former building occupants for potential interviews. To facilitate this identification, a meeting was held with Tim Tanner, presently supervisor of the estimators, who has 10 years of experience working in the building. This meeting was held at Fort Drum on November 3, 1994. Meeting participants included Dave Linneman, USACE - Kansas City District, Chuck Myers, CDM Federal Programs Corporation, and Tim Tanner. Between this meeting and discussions with Captain George Fisher, Chief of Occupational Health at Fort Drum, seventeen individuals were identified as former building occupants.

With the list finalized, a pre-interview questionnaire was prepared. The questionnaire, a medical release form, a disclosure form, a layout of the building, and a cover letter outlining the objectives of the project were sent to the identified individuals, return receipt requested. All 17 of the individuals responded. The medical release forms were sent to Captain Fisher. These forms requested that any existing medical records be forwarded to Washington Occupational Health Associates (WOHA) for review by an occupational physician. Following this review, an interview questionnaire was prepared and interviews were scheduled for April 13 and 14 at the conference room in Building 4836. Shelly Wolfe, a certified nurse practitioner employed by WOHA, conducted the interviews. The interviews were 45 minutes in duration and focused on the completion of information contained in the interview questionnaire. A copy of the questionnaire appears in Appendix A.

These interviews were used to help clarify and supplement the existing database. The nurse practitioner also responded to individual health questions posed by the interviewees. Data from these interviews was summarized in an internal report. This report listed each person's age, title, dates at Building T4002, medical history, personal health risk factors, the individual's recall of any temporal relationship of symptoms to work, and WOHA's impression concerning the work-relatedness of that person's medical problems.

Air sampling was performed by CDM Federal April 11 through April 13, 1995, inside Building T4002. Results of this sampling are reported in the Sampling and Analysis Report that appears in Appendix B.

All information collected during this project was given to the occupational physician. This included the results of wipe, soil, air, and building composition sampling; previous medical information provided by Fort Drum; locations of areas worked by the building occupants; pre-interview and interview questionnaire information; and an inventory of materials stored in the building, as provided by Tim Tanner. This information was thoroughly reviewed by the physician.

Exhibits

All available and gathered information was formatted into a table. The format allowed for a detailed review of similarities and trends of each of the identified building occupants. The table and interview reports contain both personal and work-related medical data. Both must be considered, together, as part of this study. For reasons of confidentiality, the table and interview reports are excluded from this report. They will be maintained with the WOHA project file.

Results, Conclusions, and Recommendations

In our opinion, the workers at Fort Drum, NY, experienced no long-term health problems related to their potential exposures to herbicides and pesticides at Building T4002. Several workers reported that their eyes and throat were irritated during their assignment in the building, this finding may be exposure-related. The other reported symptoms and medical illnesses do not predominate in any one organ system, nor do they otherwise suggest a common cause.

Although the wipe, soil, and air samples were collected after activities at Building T4002 had ceased, these pesticides and herbicides are relatively persistent in the environment; i.e., they tend not to readily chemically decompose. Therefore, the results of this sampling suggest a small exposure potential during the preceding years of occupancy.

The individuals who worked at Building T4002 should be reassured that their health was not jeopardized by the exposures. Their medical concerns should be evaluated and treated by their personal physicians.

APPENDIX A

Fort Drum Questionnaire

REVIEW OF SYSTEMS

Have you experienced any of the following symptoms recently, or on a continuing basis? Describe any "yes" responses, by number, at the end of this section.

	#	SYMPTOM	Y	N	DATE
MISCELLANEOUS	1	Fever			
	2	Chills			
	3	Weight Loss			
	4	Loss of Energy/Fatigue			
	5	Cancer or Tumors			
	6	Heat-Related Illness			
EYES	7	Eye Surgery			
	8	Color Blindness			
	9	Double Vision			
	10	Eye Injury			
	11	Cataract			
	12	Glaucoma			
	13	Wear glasses/contacts			
EARS	14	Ear Infection			
	15	Ear Surgery			
	16	Loss of Hearing			
	17	Ringing in Ears (Tinnitus)			
	18	Hearing Aid Use			
NOSE/THROAT	19	Sinus Trouble			
	20	Hay Fever/Allergies			
	21	Frequent Colds			
	22	Sore Throats			
	23	Frequent Hoarsness			
	24	Mouth/Dental Problems			
	25	Frequent Nose Bleeds			
HEART/LUNGS	26	Tuberculosis			
	27	Chest Surgery			
	28	Asthma			
	29	Lung Collapse			
	30	Bronchitis			
	31	Pneumonia			
	32	Asbestosis/Silicosis			
	33	Shortness of Breath			
	34	Chronic Cough			

	#	SYMPTOM	Y	N	DATE
HEART/LUNGS, CONTINUED	35	Chest Pain/Angina			
	36	Wheezing			
	37	Emphysema			
	38	Heart Surgery			
	39	High Blood Pressure			
	40	Heart Murmur			
	41	Enlarged Heart			
	42	Stress Electrocardiogram			
	43	Rheumatic Fever			
	44	Heart Palpatations			
	45	Heart Attack			
	46	Heart Medication			
CIRCULATION	47	Varicose Veins			
	48	Stroke			
	49	Leg Ulcers			
	50	Swelling of Ankles			
	51	Leg Pain on Walking			
BLOOD	52	Anemia			
	53	Leukemia/Lymphoma			
	54	Other Blood Diseases			
HEAD	55	Head Injury			
	56	Neck Injury			
ENDOCRIN	57	Diabetes			
	58	Pituitary Problems			
	59	Thyroid Problems			
NERVOUS SYSTEM	60	Frequent Headaches			
	61	Epilepsy/Seizures			
	62	Fainting Spells			
	63	Loss of Consciousness			
	64	Dizziness or Vertigo			
	65	Frequent Exhaustion			
	66	Trouble with Nerves			
	67	Worry/Depression			

Fort Drum Questionnaire

Please list each medication you currently take, the dosage, the frequency with which it is taken, and the reason for taking it:

MEDICATION	DOSAGE	FREQUENCY	REASON

FAMILY HISTORY

For Annual or Exit Exam - Indicate Change Since Last Exam

Father: ☐ Living List Diseases _____ If deceased, cause of death _____
Mother: ☐ Living List Diseases _____ If deceased, cause of death _____
Brothers: ☐ Living List Diseases _____ If deceased, cause of death _____
Sisters: ☐ Living List Diseases _____ If deceased, cause of death _____

Has any member of your immediate family had any of the following:

	YES	NO		YES	NO		YES	NO
Cancer	☐	☐	Diabetes	☐	☐	Epilepsy	☐	☐
Hypertension	☐	☐	Tuberculosis	☐	☐	Rheumatism	☐	☐
Kidney Disease	☐	☐	Heart Disease	☐	☐	Anemia/Blood Disorder	☐	☐

OCCUPATIONAL HISTORY

Beginning with most recent, list all jobs held including military. Check boxes to right for indicated exposures.

Type of Work	Employer	Dates From (mo/day/yr) To (mo/day/yr)	LEAD	BENZENE	ASBESTOS	INSECTICIDES/PESTICIDES	ORGANIC SOLVENTS	PCBs	IONIZING RADIATION	HEAVY METALS (MERCURY,CADMIUM,ETC.	OTHER

Have you ever been off work because of an illness related to work or had an illness caused by your work? ☐ Yes ☐ No
If "yes", were you seen by a physician? Please describe, including the exposure(s) and note which job above it corresponds to.
Please also describe any hazardous exposure(s) not addressed above:

_____
_____
_____
_____

Appendix B

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SAMPLING AND ANALYSIS REPORT
OCCUPATIONAL HAZARD ANALYSIS
BUILDING T4002, FORT DRUM, NEW YORK
DELIVERY ORDER NO. 0024

1.0 INTRODUCTION

1.1 Purpose of Report

This report provides the results of the air sampling conducted by CDM Federal Programs Corporation (CDM Federal) at Building T4002, Fort Drum, New York.

2.0 SITE BACKGROUND

2.1 Site Description

Building T4002 is a five-room, rectangular structure, approximately 96 feet long and 14 feet wide. The building is separated into five rooms of differing lengths and equal width. The structure was built in a way that allowed transit from one room to the next through successive doorways. Every room in the building has a visible layer of dust (a heavy layer at times) covering floors, furniture, window sills, etc. It has a wooden frame with steel siding and was built in the 1940s. The length of the building runs roughly from east to west, with the far western end used for working with pesticides and herbicides.

2.2 Site History

The western room of the building was used as a storage and mixing area for the Pest Controller on Fort Drum. In 1989 and 1994, samples of the surface soil surrounding the building and samples of building materials were collected and found to be contaminated with pesticides and herbicides. The results of this sampling were as follows.

Surface soil (0-2 feet) contaminant levels beneath the mixing and storage area and outside, immediately adjacent to this area:

- 4,4-DDT - 170,000 µg/kg
- 4,4-DDD - 40,000 µg/kg
- 4,4-DDE - 9,300 µg/kg
- 2,4-D - 140 µg/kg
- 2,4,5-TP - 49 µg/kg
- 2,4,5-T - 660 µg/kg

Composite building material samples from the east and west ends of the building and the roof. The following analytes were detected:

and filter combination were assigned a sampling location. All sample locations were checked periodically to ensure continuous operation throughout the sampling event. Additionally, a random check with the MiniBuck Calibrator was performed twice per day to ensure an acceptable pump volume was maintained. Finally, data collected and recorded daily for each sample location included: the sampling pump serial numbers and its assigned filter number; the calibrated pumps flow rate; the room number assigned to each pump/filter combination; the time of placement; the time the sampling event ended; and the flow rate of the sampling pump with its assigned filter still inline at the conclusion of each sampling event, using the MiniBuck Calibrator.

3.3 Sample Results

The collected samples were analyzed by Kemron Environmental Services of Novi, Michigan. Kemron Environmental is an AIHA accredited laboratory (PAT ID #9524). The procedure followed to analyze the 2,4-D and 2,4,5-T samples (specified in NIOSH method 5001) uses high performance liquid chromatography (HPLC) with ultraviolet (UV) detection. The procedure followed to analyze the DDD, DDE, and DDT samples (specified in NIOSH method S274) uses gas chromatography (GC). The results of these sampling events are shown in Table 1. Hard copies of these results have been provided to the Occupational Physician for incorporation into the final report. Copies of the laboratory results and quality control information appear in Attachment 2. Air Monitoring Data Sheets are included in Attachment 3.

3.4 Quality Assurance

Air samples were collected and analyzed according to the Air Sampling Plan for Building T4002 dated April 5, 1995. The only deviation from the Sampling Plan was that samples were collected over a period of 6 to 7 hours rather than the original 8 hours of sampling outlined in the Sampling Plan. This shortened period was still within the recommended collection period outlined by the NIOSH methods and had no effect on the sample results.

CDM Federal reviewed the data submitted by Kemron to determine if the data quality objectives were met. The samples were analyzed according to the NIOSH procedures and all quality control samples were within the guidelines contained in the methods.

3.5 Results Summary

There were no detectable concentrations of 2,4,5-T, 2,4-D, DDD, DDE, or DDT encountered during the sampling period. Analytical detection limits were 10 micrograms for 2,4,5-T and 2 micrograms for 2,4-D. Analytical detection limits for DDD, DDE, and DDT, were 0.01 micrograms for each of the three compounds.

TABLE 1

RESULTS OF AIR MONITORING
PESTICIDES AND HERBICIDES
FORT DRUM
BUILDING T4002

Sample Location	Sample Number	Sample Date	Sample Type	Analytical Result (μg)*	Sample Volume (m^3)**	Sample Result ($\mu g/m^3$)
RM-1	2005	4/11/95	2,4,5-T 2,4-D	<10 <2	0.746 0.746	<13 <3
RM-2	2004	4/11/95	2,4,5-T 2,4-D	<10 <2	0.716 0.716	<14 <3
RM-3	2001	4/11/95	2,4,5-T 2,4-D	<10 <2	0.754 0.754	<13 <3
RM-4	2003	4/11/95	2,4,5-T 2,4-D	<10 <2	0.758 0.758	<13 <3
RM-5	2002	4/11/95	2,4,5-T 2,4-D	<10 <2	0.726 0.726	<14 <3
RM-1	D004	4/11/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.746 0.746 0.746	<0.01 <0.01 <0.01
RM-2	D001	4/11/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.752 0.752 0.752	<0.01 <0.01 <0.01
RM-3	D003	4/11/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.718 0.718 0.718	<0.01 <0.01 <0.01
RM-4	D002	4/11/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.722 0.722 0.722	<0.01 <0.01 <0.01
RM-5	D005	4/11/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.762 0.762 0.762	<0.01 <0.01 <0.01
RM-1	2006	4/12/95	2,4,5-T 2,4-D	<10 <2	0.830 0.830	<12 <2
RM-2	2010	4/12/95	2,4,5-T 2,4-D	<10 <2	0.830 0.830	<12 <2

TABLE 1 (continued)

RESULTS OF AIR MONITORING
PESTICIDES AND HERBICIDES
FORT DRUM
BUILDING T4002

Sample Location	Sample Number	Sample Date	Sample Type	Analytical Result (μg)*	Sample Volume (m^3)**	Sample Result ($\mu g/m^3$)
RM-4	2015	4/13/95	2,4,5-T 2,4-D	<10 <2	0.779 0.779	<13 <3
RM-5	2014	4/13/95	2,4,5-T 2,4-D	<10 <2	0.738 0.738	<14 <3
Trip Blank	D011	--	DDD DDE DDT	<0.01 <0.01 <0.01	-- -- --	-- -- --
RM-1	D013	4/13/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.774 0.774 0.774	<0.01 <0.01 <0.01
RM-2	D012	4/13/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.768 0.768 0.768	<0.01 <0.01 <0.01
RM-3	D016	4/13/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.800 0.800 0.800	<0.01 <0.01 <0.01
RM-4	D014	4/13/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.742 0.742 0.742	<0.01 <0.01 <0.01
RM-5	D015	4/13/95	DDD DDE DDT	<0.01 <0.01 <0.01	0.775 0.775 0.775	<0.01 <0.01 <0.01

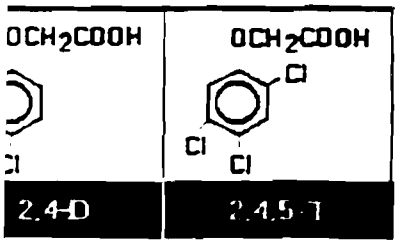
* micrograms
** cubic meters

ATTACHMENT 1

NIOSH Manual of Analytical Methods

2,4-D and 2,4,5-T **METHOD:** 8001

FORMULA: $C_8H_6Cl_2O_3$ (2,4-D) ; $C_8H_5Cl_3O_3$ (2,4,5-T)



M.W.: 221.04 (2,4-D); 255.49 (2,4,5-T)

ISSUED: 5/15/94

OSHA: 10 mg/m³ (2,4-D or 2,4,5-T)
NIOSH: Group I, II and III Pesticides [1]
ACGIH: 10 mg/m³, STEL 20 mg/m³

PROPERTIES: solid; MP 153 °C (2,4,5-T); MP 138 °C (2,4-D); VP not significant

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SYNONYMS:

2,4-D: (2,4-dichlorophenoxy)acetic acid; CAS #94-75-7.
2,4,5-T: (2,4,5-trichlorophenoxy)acetic acid; CAS #93-76-5.

SAMPLING

SAMPLER: FILTER (glass fiber, cinderless)

FLOW RATE: 1 to 3 L/min

VOL-MIN: 15 L @ 10 mg/m³
-MAX: 200 L

SHIPMENT: routine

SAMPLE STABILITY: at least 1 week @ 25 °C

BLANKS: 2 to 10 field blanks per set

ACCURACY

RANGE STUDIED: 5 to 20 mg/m³ [2,3] (100-L samples)

BIAS: not significant [2,3]

OVERALL PRECISION s_r : 0.001 2,4-D [2]; 0.033 2,4,5-T [3]

MEASUREMENT

TECHNIQUE: HPLC, UV DETECTION

ANALYTE: 2,4-D or 2,4,5-T anion

DESORPTION: 15 mL CH_3OH; stand 30 min

INJECTION VOLUME: 50 µL

ELUENT: 0.001 M $NaClO_4$-0.001 M $Na_2B_4O_7$ (2,4-D)
0.003 M $NaClO_4$-0.001 M $Na_2B_4O_7$ (2,4,5-T)

FLOW RATE: 1.7 mL/min

DETECTOR: UV @ 289 nm (2,4,5-T); 284 nm (2,4-D)

COLUMN: stainless steel, 50 cm x 2 mm ID, packed with Zipax SAX (DuPont); ambient temperature; 6900 kPa (1000 psi)

CALIBRATION: solutions of analyte in methanol

RANGE: 0.15 to 2 mg per filter

ESTIMATED LOD: 0.015 mg per filter (2,4-D) [2]; 0.030 mg per filter (2,4,5-T) [3]

PRECISION (s_r): 0.01 (2,4-D) [2]; 0.025 (2,4,5-T) [3]

APPLICABILITY:

The working range is 1.5 to 20 mg/m^3 of either compound for a 100-L air sample. This method determines 2,4-D, 2,4,5-T, and their salts, but not their esters.

INTERFERENCES:

High concentrations of esters of either compound do not interfere but require the use of a precolumn to prevent degradation of the HPLC column.

OTHER METHODS:

This method combines and replaces Methods S279 [4] and S303 [4] which are the same except for eluent composition and UV detector wavelength.

PROCEDURE

REAGENTS:

1. 2,4-dichlorophenoxyacetic acid.*

2. 2,4,5-trichlorophenoxyacetic acid.*

3. Methanol, HPLC grade.

4. LC eluent:
   a. 2,4-D: 0.001 M $NaClO_4$ and 0.001 M $Na_2B_4O_7$. Add 0.122 g $NaClO_4$ and 0.381 g $Na_2B_4O_7 \times 10H_2O$ to a 1-L volumetric flask. Bring to volume with distilled water. Mix, filter and degas the solution.

   b. 2,4,5-T: 0.003 M $NaClO_4$ and 0.001 M $Na_2B_4O_7 \times 10H_2O$. Add 0.366 g $NaClO_4$ and 0.381 g $Na_2B_4O_7 \times 10H_2O$ to a 1-L volumetric flask. Bring to volume with distilled water. Mix, filter and degas the solution.

5. Compressed, filtered air or nitrogen for drying syringes.

6. Ethanol, absolute.

7. Acetone.

8. Calibration stock solution, 400 µg/mL. Dissolve 0.400 g 2,4-D or 2,4,5-T in methanol and dilute to 1 L with methanol.

9. Recovery stock solution:

   a. Dissolve 0.248 g 2,4-D in ethanol. Dilute to 10 mL with ethanol.

   b. Dissolve 0.250 g 2,4,5-T, triethylamine salt, in acetone (or 0.250 g 2,4,5-T in methanol). Dilute to 10 mL with acetone.

   NOTE: Use the same form (e.g., acid or salt) of 2,4,5-T as in the air sample. Recovery may vary with the chemical form.

10. See special precautions.

EQUIPMENT:

1. Sampler: filter, glass fiber, binderless, in a 37-mm polystyrene two-piece cassette filter holder (Gelman type AE or equivalent).

2. Personal sampling pump, 1 to 3 L/min, with flexible connecting tubing.

3. High pressure liquid chromatograph, UV detector at 284 nm (2,4-D) and 289 nm (2,4,5-T), integrator and column (page 2).

4. Filter, PTFE, 5-µm, 13-mm diameter in Swinny stainless (13-mm) filter holder.

5. Tweezers.

6. Syringes, 20-mL luer-lock.*

7. Vials, glass, 20-mL.*

8. Volumetric flasks, convenient sizes for preparing standard solutions.*

* Wash all glassware with detergent, thoroughly rinse with tap water and distilled water.

SPECIAL PRECAUTIONS:

2,4-D and 2,4,5-T are suspected animal carcinogens [1]. 2,3,7,8-Tetrachlorodibenzo-1,4-dioxin has been identified as an impurity in 2,4,5-T. Avoid any contact with these substances.

SAMPLING:

1. Calibrate each personal sampling pump with a representative filter in line.

2. Sample at an accurately known flow rate between 1 and 3 L/min for a total sample size of 15 to 200 L. Do not exceed a total dust loading of 2 mg on the filter.

3. Obtain information on the chemical form of the analyte (i.e., ester, salt or free acid) likely to be present in the air sample.

SAMPLE PREPARATION:

4. Remove the filter from the cassette with clean tweezers and place it in a 20-mL vial.

5. Add 15 mL methanol and mix by swirling. Allow to stand at least 30 min.

6. Filter the sample.

   a. Pour the sample solution into a 20-mL syringe which is fitted with a 5-µm PTFE filter.

   b. Filter the sample into a clean vial.

   c. Clean the PTFE filter by backflushing with methanol. Rinse the syringe and plunger with methanol. Dry with air or nitrogen.

CALIBRATION AND QUALITY CONTROL:

7. Calibrate daily with at least five working standards.

   a. Dilute aliquots of calibration stock solution to 10 mL with methanol in volumetric flasks.

c. Analyze working standards (steps 9 and 10).

d. Prepare calibration graph (peak area vs. mg 2,4-D or mg 2,4,5-T).

8. Check recovery with at least four spiked media blanks at each of four levels.

a. Add aliquot of recovery stock solution to media blank.

b. Analyze using standards prepared from the recovery stock solution.

c. Calculate R (mg recovered/mg added).

MEASUREMENT:

9. Establish chromatographic conditions listed on page 2 for either 2,4-D or 2,4,5-T.

10. Inject 50 µL of sample in duplicate. Rinse and dry the syringe between samples.

NOTE 1: The analyte is the chlorinated phenoxyacetate, whether the air sample contained salts or free acid forms of 2,4-D and 2,4,5-T.

NOTE 2: Esters of 2,4-D and 2,4,5-T will not elute from the HPLC column and may, if present in large amounts, degrade the HPLC column. Protect the main column with a precolumn of Zipax SAX if esters are known to be present. The sample preparation conditions are sufficiently mild so as to preclude hydrolysis of the esters.

CALCULATIONS:

11. Read the mass of analyte, mg (corrected for recovery), in the sample (W) and average media blank (B) from the calibration curve.

12. Calculate the concentration, C (mg/m^3), of 2,4-D or 2,4,5-T in air volume, V (L), taken:

$$C = \frac{(W - B) \times 10^3}{V}, \quad mg/m^3.$$

EVALUATION OF METHOD:

Methods S279 (2,4-D) and S303 (2,4,5-T) were issued on February 17, 1978, and March 17, 1978, respectively [4], and validated using 100-L air samples [2,3,5]. Atmospheres were generated using 2,4-D dimethylamine salt for S279 and Weedar Amine BK (Amchem; equal parts of 2,4-D dimethylamine salt and 2,4,5-T triethylamine salt) for S303. Overall precision and recovery for 100-L samples were as shown, representing non-significant bias in each method:

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Method	Overall Precision (Sr)	Range Studied mg/m3	Range Studied mg per sample	Recovery @ 0.5 mg	7-Day Storage Stability, % of Day 1
S279	0.081	5 to 20	0.5 to 2	0.97	99
S303	0.053	5 to 21	0.5 to 2	0.96 to 0.99	104

REFERENCES:

[1] Criteria for a Recommended Standard...Occupational Exposure During Manufacture and Formulation of Pesticides, U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 78-174 (1978).

[2] Backup Data Report S279 for 2,4-D prepared under NIOSH Contract No. 210-76-0123 (unpublished, 1976), available as "Ten NIOSH Analytical Methods, Set 6," Order No. PB 288-629 from NTIS, Springfield, VA 22161.

[3] Backup Data Report S303 for 2,4,5-T prepared under NIOSH Contract No. 210-76-0123 (unpublished, 1976), available as "Ten NIOSH Analytical Methods, Set 6," Order No. PB 288-629 from NTIS, Springfield, VA 22161.

[4] NIOSH Manual of Analytical Methods, 2nd ed., V. 5, U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 79-141 (1979).

[5] NIOSH Research Report-Development and Validation of Methods for Sampling and Analysis of Workplace Toxic Substances, U.S. Department of Health and Human Services, Publ. (NIOSH) 80-133 (1980).

METHOD REVISED BY: Robert W. Kurimo, NIOSH/DPSE; originally validated under NIOSH Contract No. 210-76-0123.

Analyte:	DDT	Method No.:	S274
Matrix:	Air	Range:	0.49-2.60 mg/cu m
OSHA Standard:	1.0 mg/cu m - skin	Precision ($\overline{CV}_w$):	0.061
Procedure:	Filter collection, iso-octane extraction, GC	Validation Date:	2/27/76

1. Principle of the Method

1.1 A known volume of air is drawn through a glass fiber filter to collect particulate matter.

1.2 The filter is transferred to a screw cap bottle within one hour after sampling and stored for analysis.

1.3 The analyte is extracted from the filter with iso-octane. An aliquot of the extract is analyzed by gas chromatography.

1.4 The area of the resulting peak is determined and compared with the areas for standards.

2. Range and Sensitivity

2.1 This method was validated over the range of 0.494-2.60 mg/cu m at an atmospheric temperature and pressure of 26°C and 760 mm Hg, using a 90-liter sample. The probable useful range of this method is 0.10-0.30 mg/cu m for 90-liter samples.

2.2 The upper limit of the range of the method is dependent on the capacity of the glass fiber filter. If higher concentrations than those tested are to be sampled, smaller sample volumes should be used.

3. Interferences

3.1 When interfering compounds are known or suspected to be present in the air, such information, including their suspected identities, should be transmitted with the sample.

3.2 It must be emphasized that any compound which has the same retention time as the analyte at the operating conditions described in this method is an interference.

4. Precision and Accuracy

4.1 The Coefficient of Variation ($\overline{CV}$) for the total analytical and sampling method in the range of 0.494-1.60 mg/cu m was 0.061. This value corresponds to a standard deviation of 0.06 mg/cu m at the OSHA standard level. Statistical information and details of the validation and experimental test procedures can be found in Reference 11.1.

4.2 A collection efficiency of 1.00 was determined for the collection medium, thus, no bias was introduced in the sample collection step, and no correction for collection efficiency is necessary. There was also no bias in the sampling and analytical method, since analytical method recovery corrections were made. Thus, $\overline{CV}$ is a satisfactory measure of both accuracy and precision of the sampling and analytical method.

5. Advantages and Disadvantages of the Method

The sampling device is small, portable, and involves no liquids. Samples collected on filters are analyzed by means of a quick, instrumental method.

6. Apparatus

6.1 The sampling unit for the collection of personal air samples for the determination of organic aerosol has the following components:

6.1.1 The filter unit consisting of the filter media (Section 6.2) and a polystyrene 37-mm two-piece cassette filter holder. Do not use Tenite filter holders.

6.1.2 Personal Sampling Pump: A calibrated personal sampling pump whose flow can be determined to an accuracy of ±5% (Reference 11.1) at the recommended flow rate. The pump must be calibrated with a representative filter holder and filter in the line.

6.1.3 Manometer.

6.1.4 Thermometer.

6.1.5 Stopwatch.

6.2 Glass fiber filter, similar to Gelman Type AE with a 37-mm diameter. The filter must be free of organic binders. The filter is held in the two-piece filter holder supported by a backup pad. The glass fiber filter should be at least 99.7% efficient against particles as small as 0.3 microns.

6.3 Screw cap bottles. Within 1 hour after sample has been collected, the filter is transferred to a clean screw cap bottle (a 45-mm tissue sample holder is satisfactory) for shipping. The bottle caps should be lined with Teflon for proper seal.

6.4 Gas chromatograph equipped with an electrolytic conductivity detector (Tracor or equivalent). The system includes an in-line vent between the exhaust end of the GC column and the reduction furnace, a quartz furnace operated in the reductive mode, an electrolytic conductivity cell, and a conductivity bridge.

6.5 Column (4-ft long X 1/2-in O.D. glass) packed with 5% SE-30 on 80/100 mesh, acid washed DMCS Chromosorb W.

6.6 An electronic integrator or some other suitable method for measuring peak areas.

6.7 Microliter syringes: 10-microliter and other convenient sizes for making standard solutions, and 25-microliter for making GC injections.

6.8 Volumetric flasks: Convenient sizes for preparing standard solutions.

6.9 Pipets of convenient sizes.

6.10 Tweezers.

7. Reagents

7.1 DDT, reagent grade.

7.2 Iso-octane, nanograde.

7.3 Benzene, reagent grade.

7.4 Purified nitrogen.

7.5 Prepurified hydrogen.

8. Procedure

8.1 Cleaning of Equipment. All glassware used for the laboratory analysis as well as the screw cap bottles should be detergent washed and thoroughly rinsed with tap water and distilled water, and dried.

8.2 Calibration of Personal Sampling Pumps. Each personal sampling pump must be calibrated with a representative filter cassette in the line. This will minimize errors associated with uncertainties in the sample volume collected.

8.3 Collection and Shipping of Samples

8.3.1 Assemble the filter in the two-piece filter cassette holder and close firmly. The filter is held in place by a backup pad.

8.3.2 Remove the cassette plugs and attach to the personal sampling pump tubing. Clip the cassette to the worker's lapel.

8.3.3 Air being sampled should not pass through any hose or tubing before entering the filter cassette.

8.3.4 A sample size of 90 liters is recommended. Sample at a flow rate of 1.5 liters per minute. The flow rate should be known with an accuracy of ±5%.

8.3.5 Turn the pump on and begin sample collection. Since it is possible for a filter to become plugged by heavy particulate loading or by the presence of oil mists or other liquids in the air, the pump rotameter should be observed frequently, and the sampling should be terminated at any evidence of a problem.

8.3.6 Terminate sampling at the predetermined time and note sample flow rate, collection time and ambient temperature and pressure. If pressure reading is not available, record the elevation.

8.3.7 The glass fiber filter should be removed from the cassette filter holder within 1 hour of sampling and placed in a clean screw cap bottle. Care must be taken to handle the filter only with clean tweezers.

8.3.8 Carefully record the sample identity and all relevant sampling data.

8.3.9 With each batch of ten samples, submit one filter from the same lot of filters which was used for sample collection and which is subjected to exactly the same handling as for the samples except that no air is drawn through it. Label this as a blank.

8.3.10 The screw cap bottles in which the samples are stored should be shipped in a suitable container, designed to prevent damage in transit.

8.4 Analysis of Samples

8.4.1 Each sample is analyzed separately.

8.4.2 Pipet 15 ml of iso-octane into each screw cap bottle.

8.4.3 Swirl the contents in each bottle occasionally for one hour.

8.4.4 Appropriate filter blanks must be analyzed at the same time as the samples.

8.4.5 GC Conditions. The typical operating conditions for the gas chromatograph are:

1. 115 ml/min nitrogen carrier gas flow
2. 35 ml/min hydrogen gas flow to furnace
3. 790°C furnace temperature
4. 225°C transfer temperature
5. 260°C vent temperature
6. 190°C column temperature

8.4.6 Injection. The first step in the analysis is the injection of an aliquot of the sample into the gas chromatograph. To eliminate difficulties arising from blow back or evaporation of solvent within the syringe needle, one should employ the solvent flush injection technique. The 25-microliter syringe is first flushed with solvent several times to wet the barrel and plunger. Three microliters of solvent are drawn into the syringe to increase the accuracy and reproducibility of the injected sample volume. The needle is removed from the solvent, and the plunger is pulled back about 1.0 microliter to separate the solvent flush from the sample with a pocket of air to be used as a marker. The needle is then immersed in the sample, and a 15-microliter aliquot is withdrawn, taking into consideration the volume of the needle, since the sample in the needle will be completely injected. After the needle is removed from the sample and prior to injection, the plunger is pulled back 1.0 microliter to minimize evaporation of the sample from the tip of the needle. Observe that the sample occupies 14.9-15.0 microliters in the barrel of the syringe. The gas chromatograph is equipped with a valve to vent the solvent peak after it passes through the GC column, but before it enters a reduction furnace. Since a 15-microliter aliquot is likely to cause malfunction of the conductivity cell, the valve should be opened when injection is made and should be closed after the solvent (iso-octane) has been vented and before the analyte is eluted. Under the conditions above (Section 8.4.5), it was found that 20 seconds was adequate to elute the solvent. Duplicate injections of each sample and standard should be made. No more than a 3% difference in area is to be expected.

8.4.7 Measurement of area. The area of the sample peak is measured by an electronic integrator or some other suitable form of area measurement, and preliminary results are read from a standard curve prepared as discussed in Section 9.

8.5 Determination of Analytical Method Recovery

8.5.1 Need for Determination. To eliminate any bias in the analytical method, it is necessary to determine the recovery of the analyte. The analytical method recovery should be determined over the concentration range of interest.

8.5.2 Procedure for determining analytical method recovery. Six filters are spiked at each of the three levels (0.5X, 1X, and 2X the OSHA standard) using a stock solution of 225 mg of DDT in 2 ml of benzene and diluting to 10 ml with iso-octane. Three sets of six filters are spiked with appropriate volumes of the stock solution to correspond to the amount of DDT which would be collected in a 90-liter sample at the 0.5X, 1X, and 2X the OSHA standard level. Allow the filters to dry and place each filter in a cassette filter holder and allow to stand overnight. The filters are extracted and analyzed as described in Section 8.4. A parallel blank filter is also treated in the same manner except that no sample is added to it.

Analytical Method Recovery (A.M.R.) equals the weight in mg found divided by the weight in mg added to the filter, or,

$$\text{A.M.R.} = \frac{\text{mg found}}{\text{mg added}}$$

9. Calibration and Standards

It is convenient to express concentration of standards in terms of mg/15 ml iso-octane, because samples are extracted in this amount of iso-octane. A series of standards, varying in concentration over the range of interest, are prepared from the above stock solution. Dilute standards are prepared by diluting measured volumes of stock solution to known volumes with iso-octane. The standards are analyzed under the same GC conditions and during the same time period as the unknown samples. Curves are established by plotting concentration in mg/15 ml versus peak area. Note: Since no internal standard is used in the method, standard solutions must be analyzed at the same time that the sample analysis is done. This will minimize the effect of day-to-day variations and variations during the same day of the electrolytic conductivity detector response.

10. Calculations

10.1 Read the weight, in mg, corresponding to each peak area from the standard curve. No volume correction is needed, because the standard curve is based on mg/15 ml of iso-octane and the volume of sample injected is identical to the volume of the standards injected.

10.2 A correction for the blank must be made for each sample.

$$mg = mg\ sample - mg\ blank$$

where:

mg sample = mg found in sample filter
mg blank = mg found in blank filter

10.3 Divide the total weight by the analytical method recovery (A.M.R.) to obtain corrected mg/sample.

$$\text{Corrected mg/sample} = \frac{\text{mg found (Section 10.2)}}{\text{A.M.R.}}$$

10.4 The concentration of the analyte in the air sample can be expressed in mg/cu m.

$$\text{mg/cu m} = \frac{\text{mg (Section 10.3) X 1000 (liter/cu m)}}{\text{Air Volume Sampled (liter)}}$$

11. Reference

11.1 Documentation of NIOSH Validation Tests, NIOSH Contract No. CDC-99-74-45.

ATTACHMENT 2

SAMPLE CUSTODY

SOP 1-2
Revision: 1
Date: June 30, 1994
Page 1 of 8

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1.0 OBJECTIVE

Due to the evidentiary nature of samples collected during environmental investigations, possession must be traceable from the time the samples are collected until their derived data are introduced as evidence in legal proceedings. To maintain and document sample possession, sample custody procedures are followed. All paperwork associated with the sample custody procedures will be retained in CDM Federal Programs Corporation (CDM Federal) files unless the client requests that it be transferred to them for use in legal proceedings or at the completion of the contract.

2.0 BACKGROUND

2.1 Definitions

Sample - A material to be analyzed that is contained in single or multiple containers representing a unique sample identification number.

Sample Custody - A sample is under custody if:

1. It is in your possession.
2. It is in your view, after being in your possession.
3. It was in your possession and you locked it up.
4. It is in a designated secure area.

Chain-of-Custody Record - Form used to document the transfer of custody of samples from one individual to another.

Custody Seal - A custody seal is a tape-like seal that is part of the chain-of-custody process and is used to detect tampering with samples after they have been packed for shipping.

Sample Label - Adhesive label placed on sample containers to designate a sample identification number and other sampling information.

Sample Tag - Tag attached with string to a sample container to designate a sample identification number and other sampling information. Tags may be used when it is difficult to physically place adhesive labels on the container (e.g., in the case of small air sampling tubes).

3.0 RESPONSIBILITIES

Sampler - The sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched.

Field Team Leader - The Field Team Leader is responsible for ensuring that strict chain-of-custody procedures are maintained during all sampling events. The Field Team Leader is also responsible for coordinating with the subcontractor laboratory to ensure that adequate information is recorded on custody records.

4.0 REQUIRED SUPPLIES

- Chain-of-Custody Records (applicable CDM Federal forms)
- Custody seals
- Sample labels or tags
- Clear Tape

5.0 PROCEDURES

5.1 Chain-of-Custody Record

This procedure establishes a method for maintaining custody of samples through use of a Chain-of-Custody Record. This procedure will be followed for all samples collected or split samples accepted.

Field Custody

1. Collect only the number of samples needed to represent the media being sampled. To the extent possible, determine the quantity and types of samples and sample locations prior to the actual fieldwork. As few people as possible should handle samples.

2. The field sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched.

3. Sample labels or tags shall be completed for each sample, using waterproof ink.

4. The Field Team Leader determines whether proper custody procedures were followed during the fieldwork and decides if additional samples are required.

Transfer of Custody and Shipment

1. Samples are accompanied by a Chain-of-Custody Record (see Figure 1 for example of Chain-of-Custody Record). When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the analyst in the appropriate laboratory.

   - The date/time will be the same for both signatures when custody is transferred directly to another person. When samples are shipped via common carrier (e.g., Federal Express), the date/time will not be the same for both signatures. Common carriers are not required to sign the form.

   - In all cases, it must be readily apparent that the person who received custody is the same person who relinquished custody to the next custodian.

   - If samples are left unattended or a person refuses to sign, this must be documented and explained on the Chain-of-Custody Record.

2. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate custody record accompanying each shipment.

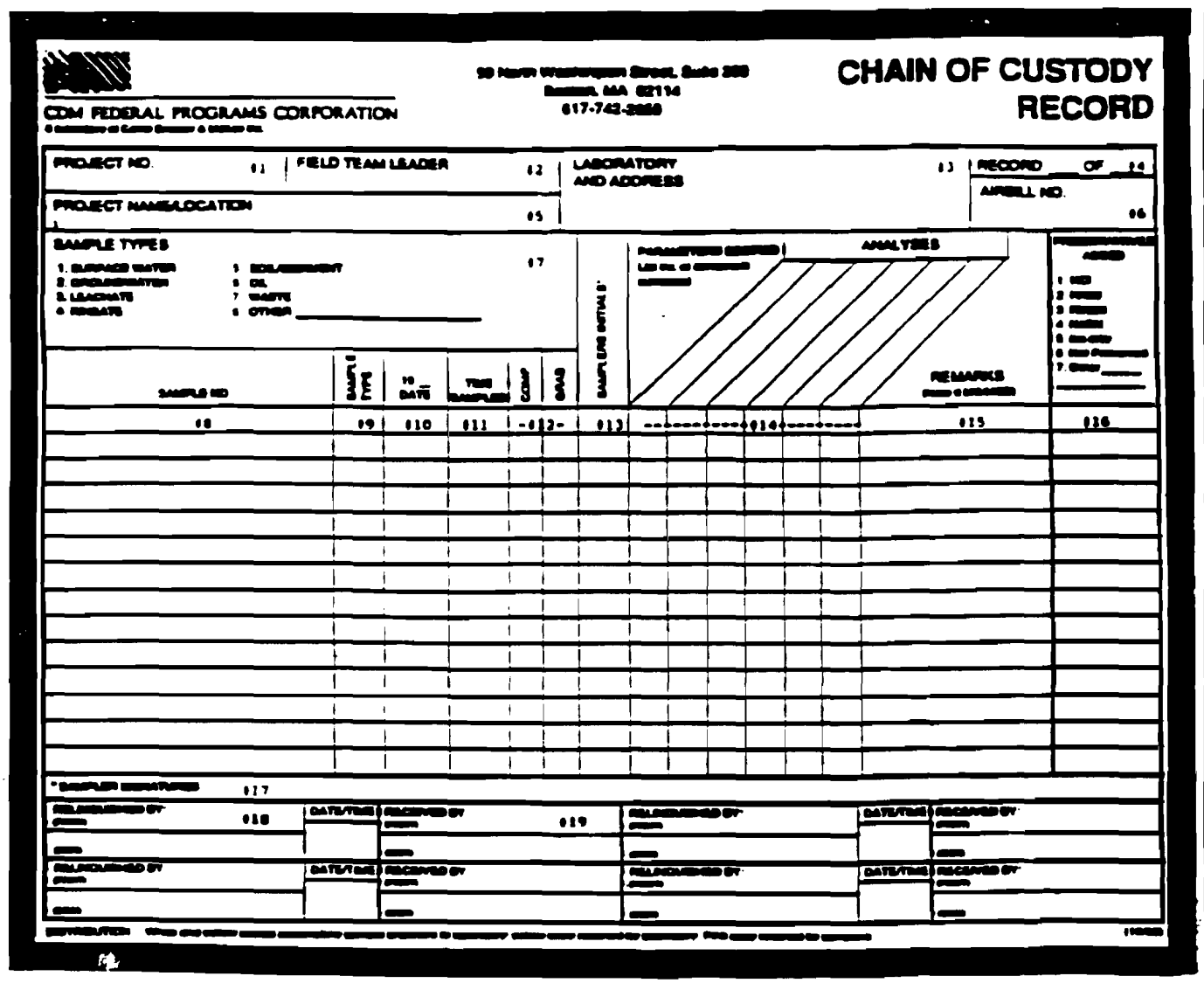
3. All shipments will be accompanied by the Chain-of-Custody Record identifying its contents. The original record will accompany the shipment, and the copies will be retained by the Field

Team Leader and if applicable, distributed to the appropriate sample coordinators. Freight bills will also be retained by the Field Team Leader as part of the permanent documentation. (Refer to Figure 1)

Procedure for Completing CDM Federal Chain-of-Custody Record (Refer to Figure 1.)

1. Record project number.
2. Record Field Team Leader for the project.
3. Record the name and address of the laboratory to which samples are being shipped.
4. Record the record number and total number of records being shipped for the day.
5. Enter the project name/location or code number.
6. Record overnight courier's airbill number.
7. Note sample type (matrix) and reference number. Include reference number on the Chain-of-Custody Record, box #9.
8. Record sample identification number.
9. Enter the reference number from box #7.
10. Enter date of sample collection.
11. Enter time of sample collection in military time.
12. Enter an X in appropriate box for sample designation - composite or grab.
13. Samplers must enter their initials next to the samples they collected.
14. List parameters for analysis and the number of containers submitted for each analysis.
15. Enter MS/MSD (matrix spike/matrix spike duplicate) if sample is for laboratory quality control, or other remarks (e.g. sample depth).

Figure 1
EXAMPLE CDM Federal Chain-of-Custody Record



CDM FEDERAL PROGRAMS CORPORATION

CHAIN OF CUSTODY RECORD

PROJECT NO. 01 | FIELD TEAM LEADER 02 | LABORATORY AND ADDRESS 03 | RECORD ___ OF 04

PROJECT NAME/LOCATION 05 | AIRBILL NO. 06

SAMPLE TYPES
1. SURFACE WATER 5. SEDIMENT
2. GROUNDWATER 6. OIL
3. LEACHATE 7. WASTE
4. RINSATE 8. OTHER _____ 07

SAMPLE NO. 08	SAMPLE TYPE 09	DATE 10	TIME 11	COMP. 12	GRAB 12	SAMPLING DETAILS 13	ANALYSES 14	REMARKS 15	PRESERVATIVE ADDED 16

* SAMPLER SIGNATURE(S) 17

RELINQUISHED BY 18	DATE/TIME	RECEIVED BY 19	RELINQUISHED BY	DATE/TIME	RECEIVED BY
RELINQUISHED BY	DATE/TIME	RECEIVED BY	RELINQUISHED BY	DATE/TIME	RECEIVED BY

DISTRIBUTION

NOTE: If requested by the client, different Chain-of-Custody records may be used. Copies of the template for this record may be obtained from the Fairfax Graphics Department.

16. Record the type of the preservative added by reference number and sample pH. Use the remarks column if no space is dedicated to preservative.

17. All samplers must sign in the space provided.

18. The originator checks information entered in items 1 through 17 and then signs the top left "Relinquished by" box, prints his/her name, and enters the current date and time (military).

    - Upon completion of the custody record form, the top two copies (usually white and yellow) shall be sent with the samples to the laboratory; the bottom copy (usually pink) is retained for the project files. Additional copies will be retained for the project file or distributed as required to the appropriate sample coordinators.

19. The laboratory sample custodian receiving the samples checks the sample label information against the custody record form. He or she also checks sample condition and notes anything unusual under "Remarks" on the custody record form. The laboratory custodian receiving custody signs in the adjacent "Received by" box and keeps the pink copy. The white copy is returned to CDM Federal.

5.2 Sample Labels and Tags

Sample labels or tags will be utilized for all samples collected or accepted for CDM Federal projects.

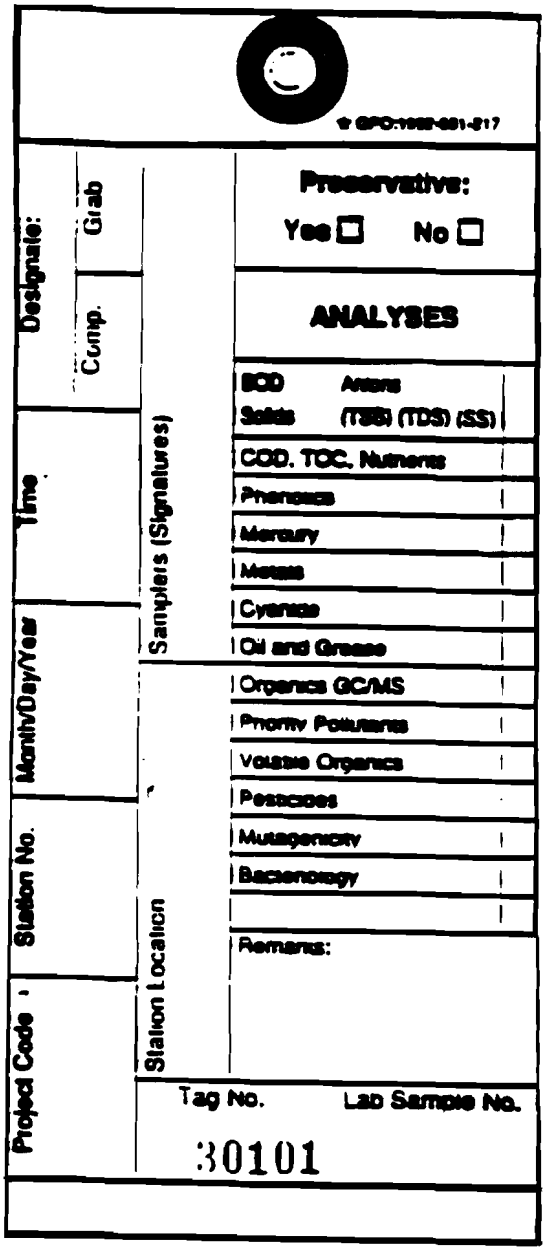
1. Place adhesive labels directly on the sample containers. Place clear tape over the label to protect from moisture.

2. Sample tags will be securely attached to the sample bottle. On 80 oz. amber bottles, the tag string may be looped through the ring style handle and tied. On all other containers, it is recommended that the string be looped around the neck of the bottle, then twisted and relooped around the neck until the slack in the string is removed.

3. One label or tag will be completed for each sample container collected. Each label or tag will be completed as follows (see Figure 2 for example of sample tag); labels are completed with the equivalent information:

    - Record the Project Code (i.e., project or task number).
    - Enter the Station Number if applicable.
    - Record the date to indicate the month, day, and year of sample collection.
    - Enter the time (military) of sample collection.

Figure 2
EXAMPLE Sample Tag



NOTE: Equivalent sample labels or tags may be used.

- Place a check to indicate composite or grab sample.
- Record the sample location.
- Samplers must sign in the space provided.
- Place a check next to "yes" or "no" to indicate if a preservative was added.
- Under "analyses," place a check next to the parameters for which the sample is to be analyzed. If the desired analysis is not listed, write it in the empty slot. Note: Do not write in the box for "laboratory sample number."
- Under "remarks," add additional, relevant information.

5.3 Custody Seals

Custody seals must be placed on the shipping containers prior to shipment. The seal should be signed and dated by a field team member.

Custody seals may also be placed on individual sample bottles. Check with the client or refer to EPA regional guidelines for direction.

5.4 Sample Shipping

CDM Federal's Standard Operating Procedure 2-5: Packaging and Shipping of Environmental Samples establishes a uniform method for packaging and shipping low-level environmental samples.

6.0 RESTRICTIONS/LIMITATIONS

For EPA Contract Laboratory Program (CLP) sampling events, combined chain-of-custody/traffic report forms or other EPA-specific records may be utilized. Refer to regional guidelines for completing these forms.

7.0 REFERENCES

U.S. Environmental Protection Agency, *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.

U.S. Environmental Protection Agency, *Samplers Guide to the Contract Laboratory Program*, EPA/540/P-90/006, December 1990.

PACKAGING AND SHIPPING OF ENVIRONMENTAL SAMPLES

SOP 2-5
Revision: 1
Date: June 30, 1994
Page 1 of 3

Prepared: David O. Johnson 7-19-94 Signature/Date
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QA Review: Marguerite Gomes 7/22/94 Signature/Date
Approved: [signature] 8/12/94 Signature/Date
Issued: Rose Mary Ellerbrock 8/19/94 Signature/Date

1.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to establish packaging and shipping requirements and guidelines for environmental sample shipping.

2.0 BACKGROUND

2.1 Definitions

Environmental Sample - Environmental Sample is any sample that has less than reportable quantities for any hazardous constituents according to Department of Transportation (DOT) regulations promulgated in 49 CFR - Part 172.

2.2 Discussion

Proper packaging and shipping is necessary to ensure the protection of the integrity of environmental samples shipped for analysis.

2.3 Associated Procedure

- CDM Federal SOP 1-2, Sample Custody

3.0 RESPONSIBILITIES

Field Team Leader - The Field Team Leader is responsible for ensuring that packaging and sampling procedures are conducted in accordance with this SOP. The Field Team Leader is also responsible for ensuring that laboratory analysis of samples is properly coordinated by CDM Federal.

4.0 REQUIRED EQUIPMENT

- Coolers with return address of CDM Federal office
- Heavy-duty plastic garbage bags
- Plastic zip-top bags, small and large
- Clear Tape
- Fiber tape
- Duct tape
- Vermiculite
- Bubble wrap (optional)
- Ice
- Chain-of-Custody seals
- Completed Chain-of-Custody record or CLP custody records if applicable
- Completed Bill of Lading
- "This End Up" and directional arrow labels

5.0 PROCEDURES

The following steps must be followed when packing sample bottles and jars for shipment:

1. Select a sturdy cooler in good repair. Secure and tape the drain plug with fiber or duct tape. Line the cooler with a large heavy-duty plastic garbage bag.

2. Be sure the caps on all bottles are tight (will not leak); check to see that labels and chain-of-custody records are completed properly.

3. Place all bottles in separate and appropriately sized plastic zip-top bags and close the bags. Up to three VOA vials may be packed in one bag. Bottles may be wrapped in bubble wrap. Optionally, place three to six VOA vials in a quart metal can and then fill the can with vermiculite.

4. Place two to four inches of vermiculite into the bag in the cooler and then place the bottles and cans in the bag with sufficient space to allow for the addition of more vermiculite between the bottles and cans. It is preferable to place glass sample bottles and jars into the cooler vertically. Due to the strength properties of a glass container, there is much less chance for breakage when the container is packed vertically rather than horizontally.

5. Put ice in large plastic zip-top bags (double bagging the zip-tops is preferred) and properly seal. Place these ice bags on top of, or between, the samples. Several bags of ice are required for temperature control. Fill all remaining space between the bottles or cans with vermiculite. Securely fasten the top of the large garbage bag with fiber or duct tape.

6. Place the completed Chain-of-Custody Record or the CLP Traffic Report Form (if applicable) for the laboratory into a plastic zip-top bag, seal the bag, tape the bag to the inner side of the cooler's lid, and then close the cooler.

7. Fiber tape shall be wrapped around each end of the cooler two times, and completed Chain-of-Custody seals affixed to the top opposite sides of the cooler, half on the fiber tape so that the cooler cannot be opened without breaking the seal. Complete two more wrap arounds with fiber tape; place clear tape over custody seals.

8. The shipping container lid must be marked "THIS END UP" and arrow labels which indicate the proper upward position of the container should be affixed to the cooler. A label containing the name and address of the shipper (CDM Federal) shall be placed on the outside of the container. Labels used in the shipment of hazardous materials (such as Cargo Only Air Craft, Flammable Solids, etc.) are not permitted to be on the outside of the container used to transport environmental samples and shall not be used. The name and address of the laboratory shall be placed on the container, or when shipping by common courier, the Bill of Lading shall be completed and attached to the lid of the shipping container.

6.0 RESTRICTIONS/LIMITATIONS

The holding times for the samples packed for shipment must not be exceeded. It is recommended that samples be packed in time to be shipped nightly for overnight delivery. Use caution when shipping samples for weekend delivery; make arrangements with laboratory before sending samples.

7.0 REFERENCES

U.S. Environmental Protection Agency, *Sampler's Guide to the Contract Laboratory Program*, EPA/540/P-90/006, December 1990.

U.S. Environmental Protection Agency, Region IV, *Standard Operating Procedures and Quality Assurance Manual*, February 1991.

FIELD LOGBOOK CONTENT AND CONTROL

SOP 4-1
Revision: 2
Date: January 5, 1995

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1.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to set CDM Federal criteria for content entry and form of field logbooks.

2.0 BACKGROUND

2.1 Definitions

Biota - The flora and fauna of a region.

Decontamination - To remove contaminants from field sampling equipment that might bias analytical results.

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians.

2.2 Discussion

Information recorded in field logbooks include observations, data, calculations, time, weather, description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

3.0 RESPONSIBILITIES

Field Team Leader (FTL) - The FTL is responsible for ensuring the nature and form of data entries are conducted in accordance with this procedure.

Site Personnel - All CDM Federal employees who make entries in field logbooks during on-site activities are required to read this procedure prior to engaging in this activity. The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance.

4.0 REQUIRED EQUIPMENT

- Site-specific plans
- Field notebook
- Indelible black or blue ink pen
- Ruler or similar scale (in some circumstances)

5.0 PROCEDURES

5.1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks must be familiar with other pertinent CDM Federal and site SOPs. These should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation. These procedures should be located at the field office.

Field logbooks shall be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the logbook. Prior to use in the field, each logbook will be marked with a specific document control number issued by the document control administrator. The following information shall be recorded on the cover of the logbook:

- Field Logbook Document Control Number
- Activity (if the logbook is to be activity-specific)
- Name of CDM Federal contact and phone number(s)
- Start date

The first few (approximately five) pages of the logbook shall be reserved for a table of contents. Mark the first page with the heading and enter the following:

TABLE OF CONTENTS

The remaining pages of the Table of Contents will be designated as such with "TOC" written on the top center of each page.

5.2 Operation

The following is a list of requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the logbook. If data collection forms are specified by an activity-specific plan, this information need not be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.

- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.

- Do not erase or blot out any entry at any time. Indicate any deletion by a single line through the material to be deleted. Initial and date each deletion. Take care to not obliterate what was written previously.

- Do not remove any pages from the book.

- Record as much information as possible.

Specific requirements for field logbook entries include:

- Initial and date each page
- Sign and date the final page of entries for each day
- Initial and date all changes
- Multiple authors must sign out the logbook by inserting the following:

  Above notes authored by:
  - (Sign name)

- (Print name)
- (Date)

- A new author must sign and print his/her name before additional entries are made
- Draw a diagonal line through the remainder of the final page at the end of the day
- Record the following information on a daily basis:

  - Date and time
  - Name of individual making entry
  - Names of field team and other persons on-site
  - Description of activity being conducted including station (i.e., well, boring, sampling location number) if appropriate
  - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  - Level of personal protection to be used
  - Serial numbers of instruments
  - Required calibration information
  - Serial/tracking numbers on documentation (e.g., carrier airbills)

Entries into the field logbook shall be preceded with the time (written in military units) of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In these cases, the logbook must reference the automatic data record or form.

At each station where a sample is collected or an observation or measurement made, a detailed description of the location of the station is required. Use a compass (include a reference to magnetic declination corrections), scale, or nearby survey markers, as appropriate. A sketch of station location may be warranted. All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is toward the top of the page.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities

- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.

- Problems, downtime, or delays
- Upgrade or downgrade of personal protection equipment

5.3 Post-Operation

To guard against loss of data due to damage or disappearance of logbooks, completed pages shall be periodically photocopied (weekly, at a minimum) and forwarded to the field or project office. Other field records shall be photocopied and submitted regularly and as promptly as possible to the office. When possible, electronic media such as disks and tapes should be copied and forwarded to the office.

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook shall be submitted to the records file.

6.0 RESTRICTIONS/LIMITATIONS

Field logbooks constitute the official record of on-site technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM Federal personnel and their subcontractors. They are documents that may be used in court to indicate and defend dates, personnel, procedures, and techniques employed during site activities. Entries made in these notebooks should be factual, clear, precise, and as non-subjective as possible. Field logbooks, and entries within, are not to be utilized for personal use.

7.0 REFERENCES

Sandia National Laboratories, *Procedure for Preparing, Sampling and Analysis Plan, Site-Specific Sampling Plan, and Field Operating Procedures*, QA-02-03, Albuquerque Environmental Program Department 3220, Albuquerque, New Mexico, 1991.

Sandia National Laboratories, Division 7723, *Field Operation Procedure for Field Logbook Content and Control*, Environmental Restoration Department, Albuquerque, New Mexico, 1992.

THIS PAGE INTENTIONALLY BLANK TO CORRECT AN ERROR IN PAGE NUMBERING. The total number of pages should have been 5. The procedure is complete in 5 pages.

ATTACHMENT 2

KEMRON ENVIRONMENTAL SERVICES
39830 GRAND RIVER B-2
NOVI, MICHIGAN 48375

Phone: (810)474-4200

CDM/FEDERAL PROGRAMS CORP.
13135 LEE JACKSON
MEMORIAL HWY
FAIRFAX, VIRGINIA 22033
Attn: CHUCK MEYERS
Invoice Number:

Order #: 95-04-136
Date: 05/04/95 18:41
Work ID: 7801034PRSITE
Date Received: 04/20/95
Date Completed: 05/04/95
Client Code: 05_CDM

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	D004
02	D001
03	D003
04	D002
05	D005
06	D008
07	D010
08	D009
09	D006
10	D007
11	D011
12	D013
13	D012
14	D016
15	D014
16	D015

Sample Number	Sample Description
17	2-005
18	2-004
19	2-001
20	W-003
21	2-002
22	2-006
23	2-010
24	2-007
25	2-008
26	2-009
27	2-011
28	2-016
29	2-013
30	2-012
31	2-015
32	2-014

Charles O'Bryan

Certified By
Charles O'Bryan

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Sample: 01A D004 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 02A D001 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 03A D003 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 04A D002 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 05A D005 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 06A D008 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL

Test Description	Result	Det Limit	Units	Analyzed	By
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 07A D010 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 08A D009 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 09A D006 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 10A D007 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 11A D011 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Sample: 12A D013 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 13A D012 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 14A D016 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 15A D014 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 16A D015 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
DDD	<0.01	0.01	ug	05/04/95	JL
DDE	<0.01	0.01	ug	05/04/95	JL
DDT	<0.01	0.01	ug	05/04/95	JL

Sample: 17A 2-005 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Sample: 18A 2-004 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 19A 2-001 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 20A W-003 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 21A 2-002 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 22A 2-006 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 23A 2-010 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 24A 2-007 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB

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Test Description	Result	Det Limit	Units	Analyzed	By
2,4-D	<2	2	ug	05/04/95	KB

Sample: 25A 2-008 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 26A 2-009 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 27A 2-011 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 28A 2-016 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 29A 2-013 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 30A 2-012 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Sample: 31A 2-015 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

Sample: 32A 2-014 **Collected:**

Test Description	Result	Det Limit	Units	Analyzed	By
2,4,5-T	<10	10	ug	05/04/95	KB
2,4-D	<2	2	ug	05/04/95	KB

DDD METHOD:P&CAM S274

DDE METHOD:P&CAM S274

DDT METHOD:P&CAM S274

2,4,5-T Method: NIOSH 5001

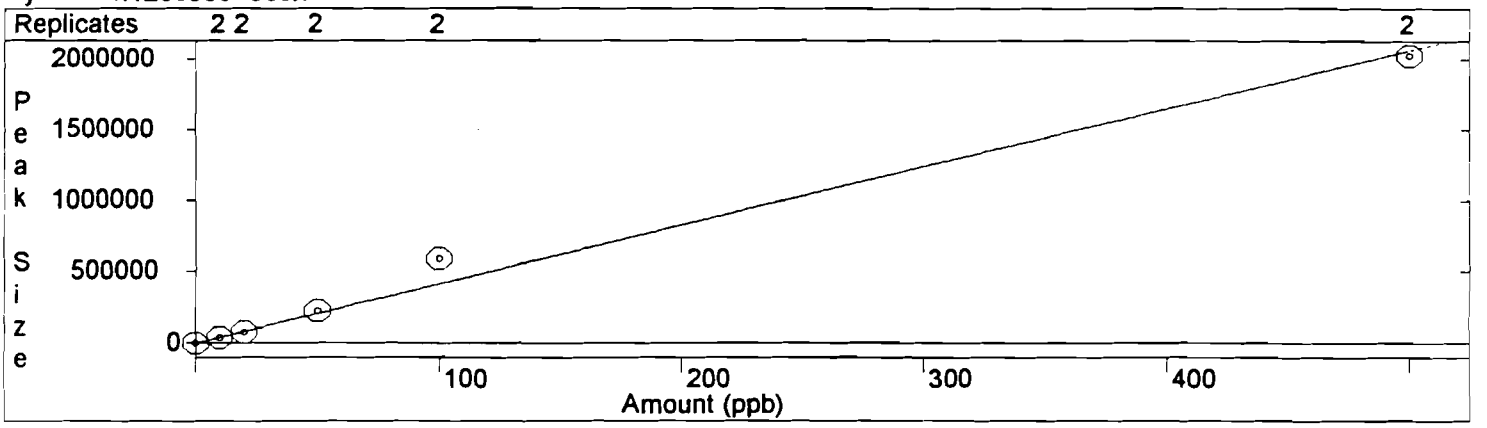
2,4-D Method: NIOSH 5001

Calibration Curves Report
File: c:\star\ecd052.mth
Detector: ADC Board, Address: 16, Channel ID: A

DDE

External Standard Analysis
Curve Type: Linear
Origin: Force (Edited)
y = +4.125858e+003x

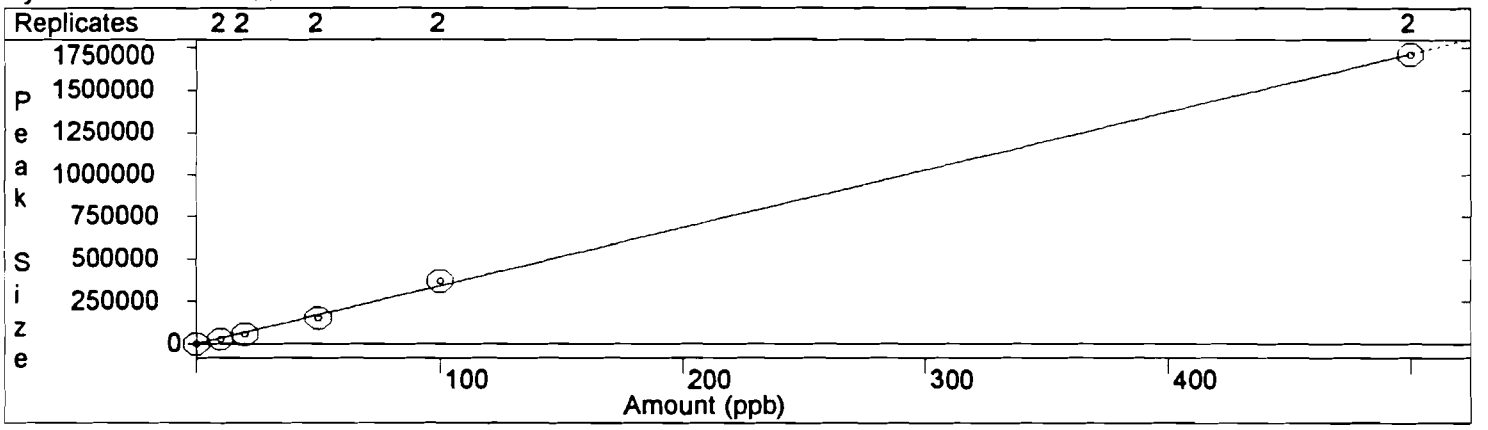
Resp. Fact. RSD: 17.44%
Corr. Coef.(R^2): 0.990823



DDD

External Standard Analysis
Curve Type: Linear
Origin: Force (Edited)
y = +3.427347e+003x

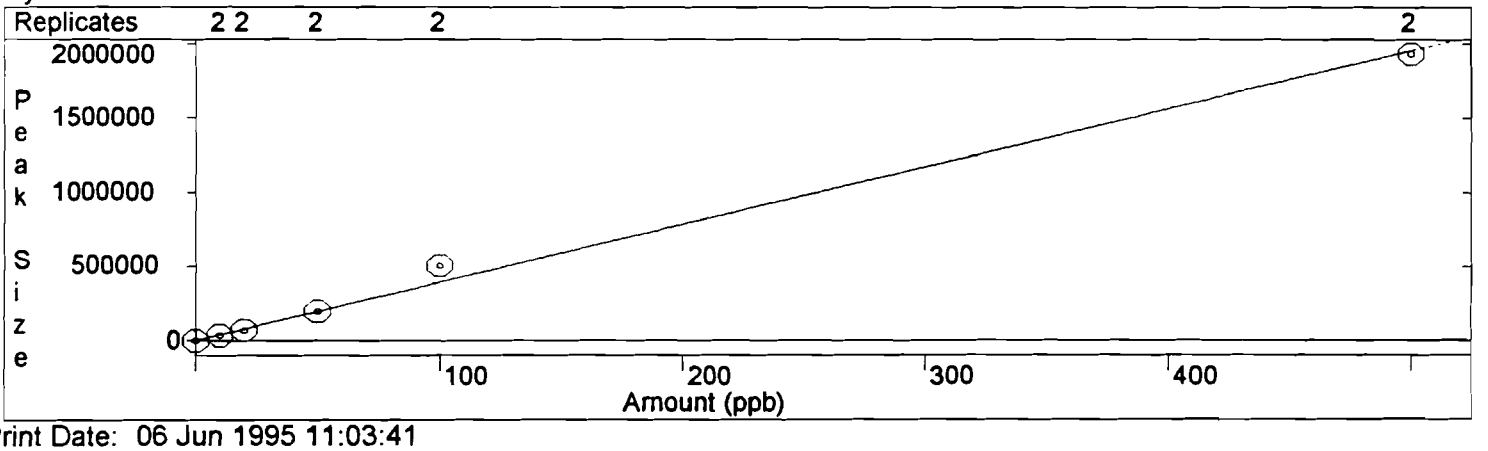
Resp. Fact. RSD: 12.48%
Corr. Coef.(R^2): 0.999308



DDT

External Standard Analysis
Curve Type: Linear
Origin: Force (Edited)
y = +3.909758e+003x

Resp. Fact. RSD: 15.18%
Corr. Coef.(R^2): 0.995684



Print Date: 06 Jun 1995 11:03:41

GC/ECD - Spike Recovery Report

Date: 5/5/95

Analyst: JL

Compound	Amount Spiked	Amount Recovered	% Recovery
DDD	200 ng	224 ng	112
DDE	200 ng	239.5 ng	119.7
DDT	200 ng	221 ng	110

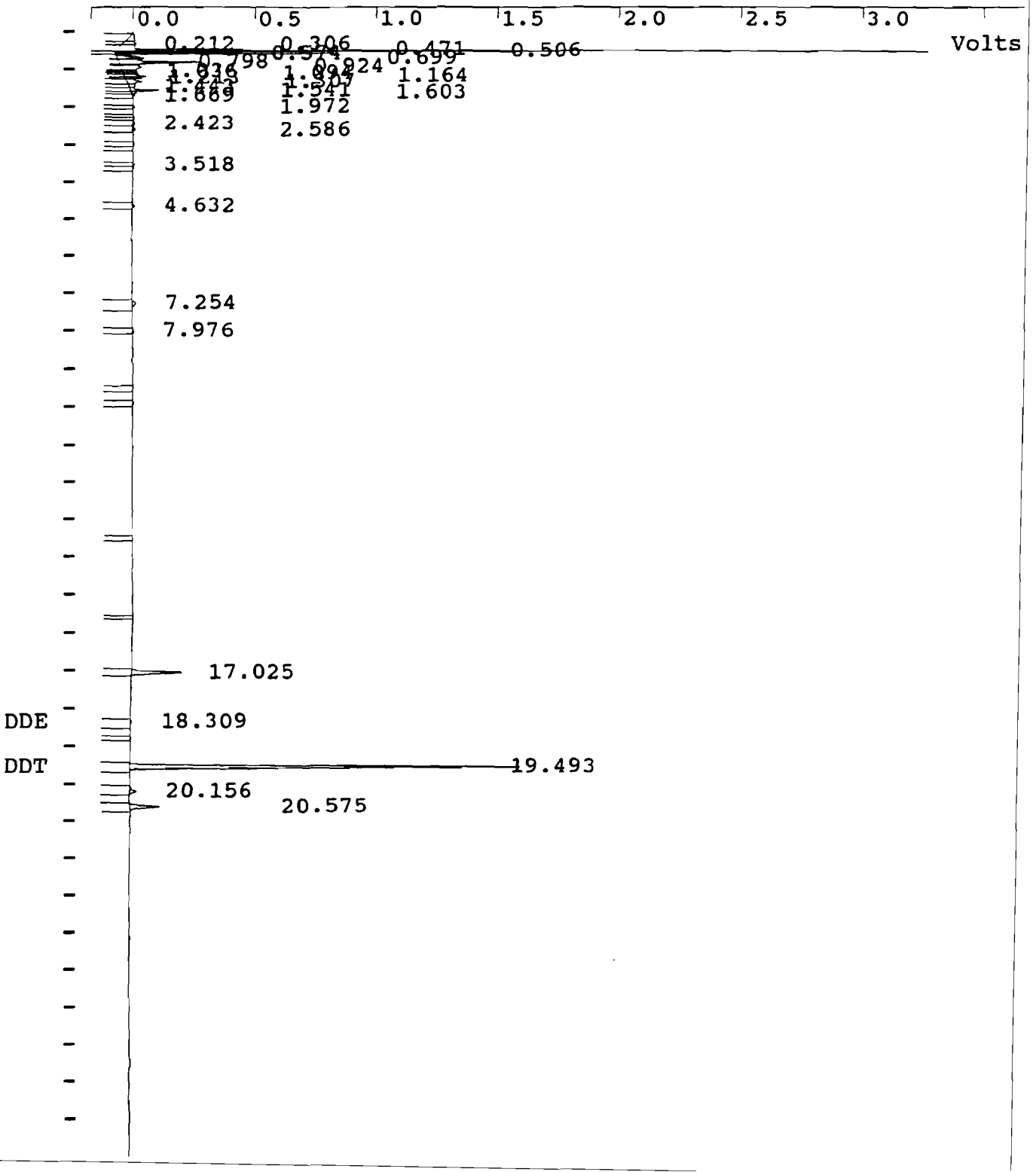
Title : DB5-30 meter-Channel A
Run File : C:\STAR\MODU. 16\SUB\EC502001.RUN
Method File : C:\STAR\ECD052.MTH
Sample ID : DDT Breakdown

Injection Date: 2-MAY-95 4:22 PM Calculation Date: 3-MAY-95 10:14 AM

Operator : Lane Detector Type: ADCB (10 Volts)
Workstation: DIGITAL Bus Address : 16
Instrument : Varian 3400 ECD Sample Rate : 10.00 Hz
Channel : A = ECD A 10 VDC Run Time : 30.002 min

********** Star Chromatography Software ********** Version 4.01 **********

Chart Speed = 0.66 cm/min Attenuation = 1580 Zero Offset = 4%
Start Time = 0.000 min End Time = 30.002 min Min / Tick = 1.00



Title : DB5-30 mete. Channel A
Run File : C:\STAR\MODULE16\SUB\EC502001.RUN
Method File : C:\STAR\ECD052.MTH
Sample ID : DDT Breakdown

Injection Date: 2-MAY-95 4:22 PM Calculation Date: 3-MAY-95 10:14 AM

Operator : Lane Detector Type: ADCB (10 Volts)
Workstation: DIGITAL Bus Address : 16
Instrument : Varian 3400 ECD Sample Rate : 10.00 Hz
Channel : A = ECD A 10 VDC Run Time : 30.002 min

********** Star Chromatography Software ********** Version 4.01 **********

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: External Standard

Peak No.	Peak Name	Result (ppb)	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1		0.0000	0.212	0.000	25577	BV	18.1	
2		0.0000	0.306	0.000	31924	VV	3.9	
3		0.0000	0.471	0.000	81561	VV	1.5	
4		0.0000	0.506	0.000	185259	VP	0.1	
5		0.0000	0.574	0.000	117117	PV	0.7	
6		0.0000	0.699	0.000	21414	TS	0.0	
7		0.0000	0.798	0.000	114381	VV	1.4	
8		0.0000	0.924	0.000	51317	VV	5.7	
9		0.0000	1.036	0.000	14639	VV	2.4	
10		0.0000	1.094	0.000	19501	VV	2.6	
11		0.0000	1.164	0.000	27755	VV	2.0	
12		0.0000	1.213	0.000	18607	VV	2.1	
13		0.0000	1.307	0.000	33854	VV	2.3	
14		0.0000	1.443	0.000	11033	VV	2.1	
15		0.0000	1.541	0.000	27739	VV	1.7	
16		0.0000	1.603	0.000	6707	VV	2.9	
17		0.0000	1.669	0.000	2996	VB	0.0	
18		0.0000	1.972	0.000	2147	BB	2.9	
19		0.0000	2.423	0.000	3071	VV	4.0	
20		0.0000	2.586	0.000	4614	VB	3.5	
21		0.0000	3.518	0.000	2700	BV	3.5	
22		0.0000	4.632	0.000	4891	BB	4.2	
23		0.0000	7.254	0.000	10670	BB	5.5	
24		0.0000	7.976	0.000	2315	BB	3.8	
25		0.0000	17.025	0.000	85441	BB	3.9	
26	DDE	0.7606	18.309	0.408	3138	BB	3.5	
27	DDT	157.3891	19.493	0.003	615354	BB	3.6	
28		0.0000	20.156	0.000	12514	BB	3.9	
29		0.0000	20.575	0.000	55131	BB	4.2	
	Totals:	158.1497		0.411	1593367			

$0.7606 / (157.1497 + 0.7606) \times 100 = 0.4$

Total Unidentified Counts : 974874 counts

Detected Peaks: 39 Rejected Peaks: 10 Identified Peaks: 2

Amount Standard: N/A Multiplier: 1.000000 Divisor: 1.000000

Baseline Offset: -70 micr. olts

Noise (used): 1170 microVolts - monitored before this run

Rack: 1 Vial: 1 Injection Number: 1 Injection Volume: 1.0 ul

****

Title : DB-608 30 meter-Channel B
Run File : C:\STAR\MODU 16\SUB\EC502001.RUN
Method File : C:\STAR\ECD052.MTH
Sample ID : DDT Breakdown

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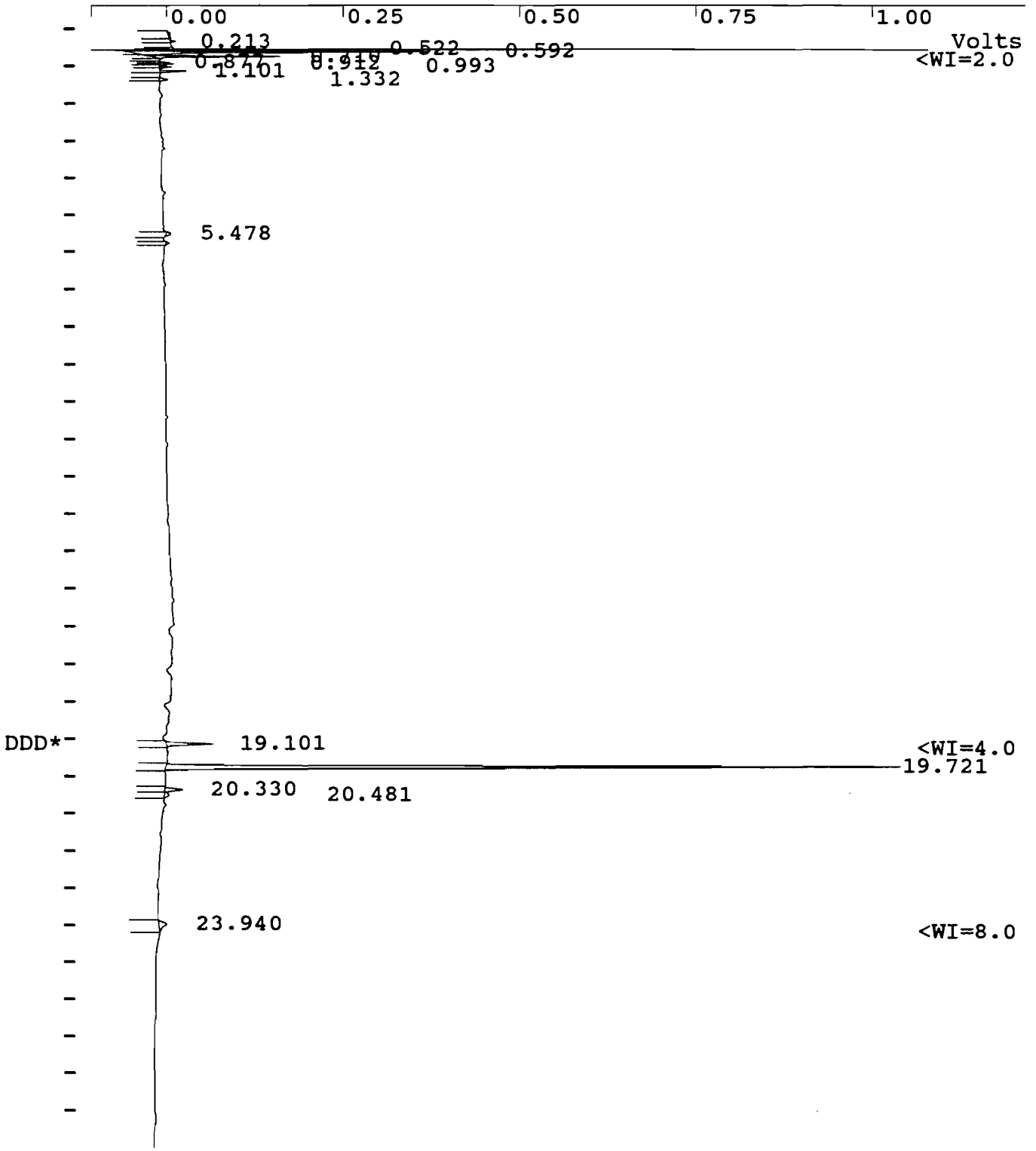
Injection Date: 2-MAY-95 4:22 PM Calculation Date: 3-MAY-95 10:21 AM

Operator : Lane
Workstation: DIGITAL
Instrument : Varian 3400 ECD
Channel : B = ECD B 10 VDC

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 30.002 min

********** Star Chromatography Software ********** Version 4.01 **********

Chart Speed = 0.66 cm/min Attenuation = 545 Zero Offset = 7%
Start Time = 0.000 min End Time = 30.002 min Min / Tick = 1.00



Title : DB-608 30 m[illegible]er-Channel B
Run File : C:\STAR\MODULE16\SUB\EC502001.RUN
Method File : C:\STAR\ECD052.MTH
Sample ID : DDT Breakdown

Injection Date: 2-MAY-95 4:22 PM Calculation Date: 3-MAY-95 10:21 AM

Operator : Lane Detector Type: ADCB (10 Volts)
Workstation: DIGITAL Bus Address : 16
Instrument : Varian 3400 ECD Sample Rate : 10.00 Hz
Channel : B = ECD B 10 VDC Run Time : 30.002 min

********** Star Chromatography Software ********** Version 4.01 **********

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: External Standard

Peak No.	Peak Name	Result (ppb)	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1		0.0000	0.213	0.000	3282	BV	18.1	
2		0.0000	0.522	0.000	50652	BP	0.6	
3		0.0000	0.592	0.000	86383	PV	1.3	
4		0.0000	0.710	0.000	27478	VB	1.1	
5		0.0000	0.877	0.000	2706	BV	1.8	
6		0.0000	0.912	0.000	3660	VV	1.7	
7		0.0000	0.993	0.000	3666	VV	1.8	
8		0.0000	1.101	0.000	8023	VB	1.9	
9		0.0000	1.332	0.000	3793	BB	3.0	
10		0.0000	5.478	0.000	2789	BB	0.0	
11	DDD	10.0487	19.101	-0.010	24646	BB	3.5	
12	DDT	147.0232	19.721	0.001	391347	BB	3.5	
13		0.0000	20.330	0.000	11035	BV	4.1	
14		0.0000	20.481	0.000	4383	VB	0.0	
15		0.0000	23.940	0.000	9642	BB	8.5	
	Totals:	157.0719		-0.009	633485			

10.0487 / 147.0232 x 10.0487 x 100 = [illegible]

Total Unidentified Counts : 217491 counts

Detected Peaks: 17 Rejected Peaks: 2 Identified Peaks: 2

Amount Standard: N/A Multiplier: 1.000000 Divisor: 1.000000

Baseline Offset: -8 microVolts

Noise (used): 1850 microVolts - monitored before this run

Rack: 1 Vial: 1 Injection Number: 1 Injection Volume: 1.0 ul

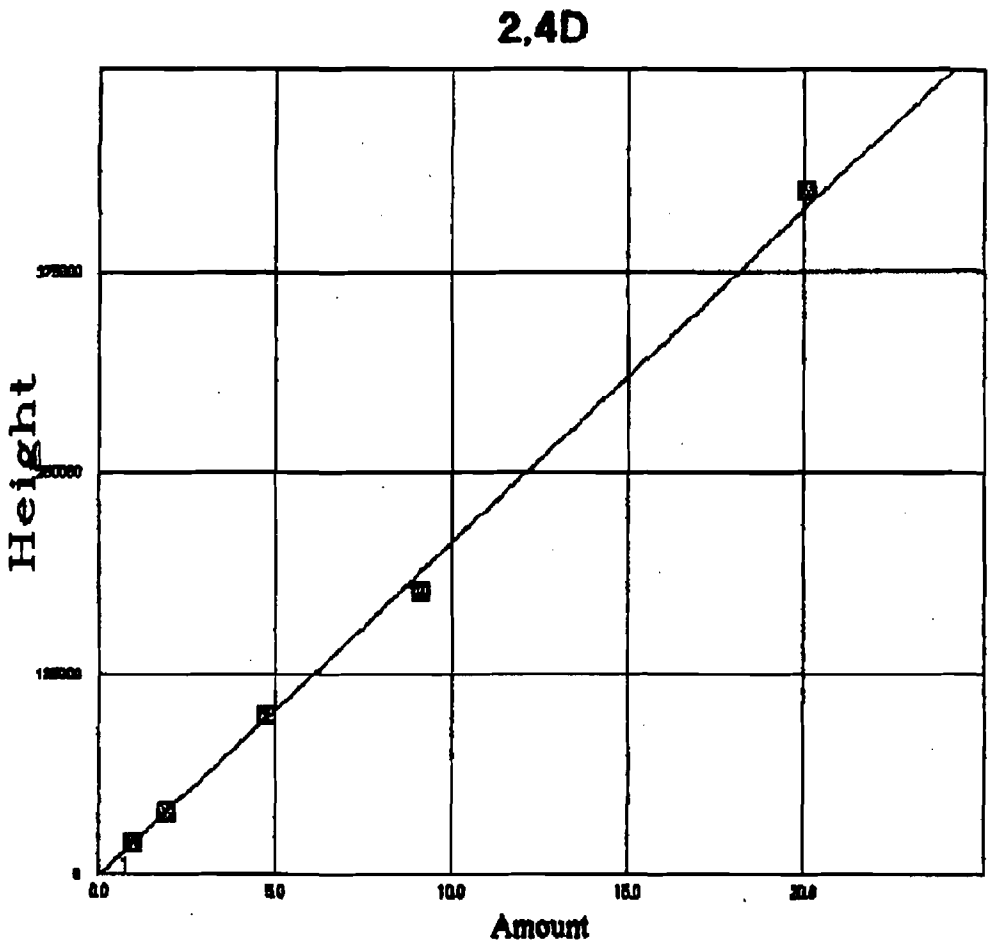
****

K46

CALPLOT Output For Sample File: "C:\DATA\2450.SMP"
Date: 6/8/95 Time: 14:48

Curve Parameters:

Curve #1 : First Order Polynomial Fit
Weighting Factor = 1/x r^2 = 0.997882
Calibration Curve = (-733.947266) + (28769.658203)X



	ug Spiked	ug Recovered	% Recovery
Rec Blk	—	—	—
Rec 1	10.0	9.7	97
Rec 2	10.0	10.2	102

CALPLOT Data Lists For Sample File: "C:\DATA\2450.SMP"
Date: 5/1/95 Time: 05:52

Data Lists With Calculated Values For Each Fit:

Curve #1 : First Order Polynomial Fit
Weighting Factor = 1/x r^2 = 0.997802

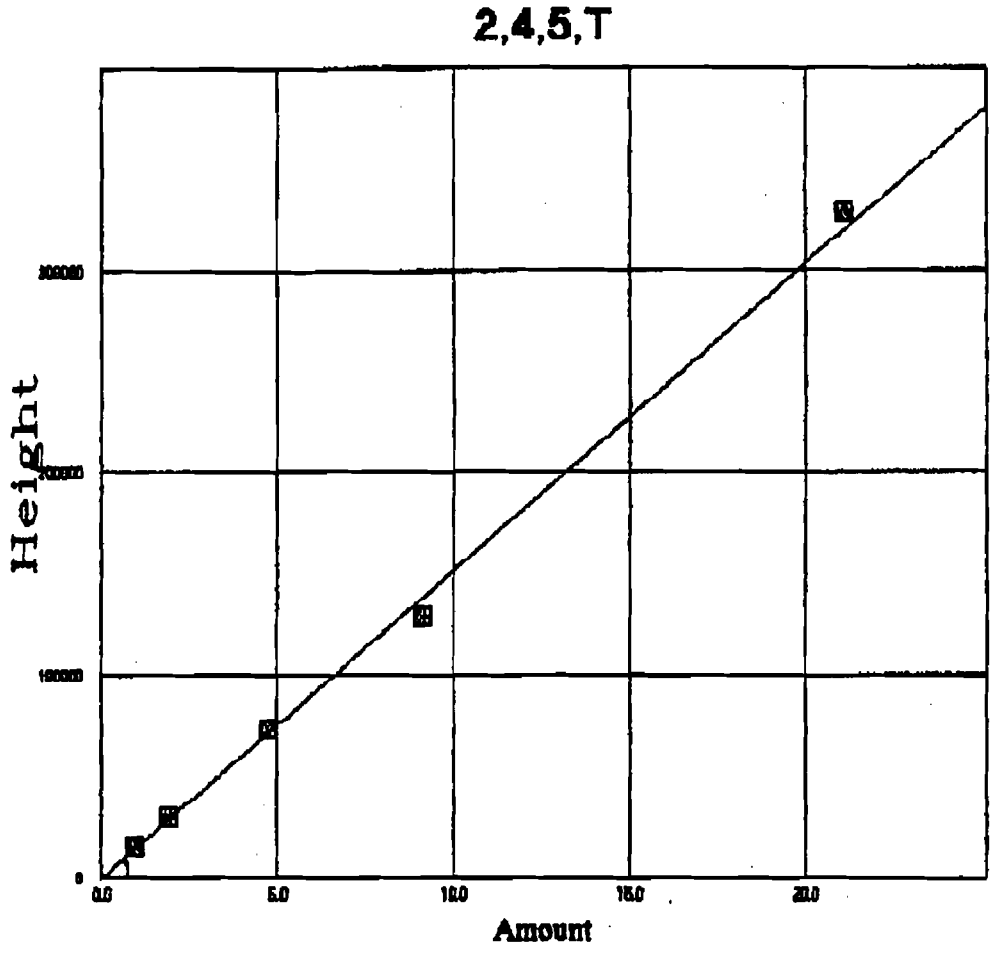
Calibration Curve = (-733.947266) + (20769.658203)X

Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff.	Observed Y-Value	Calculated Y-Value	Delta	%Diff.
A	0.990000	1.019811	-0.029811	-3.011	20447.185547	19928.013672	519.171875	2.538
B	1.960000	1.937500	0.022697	1.158	39583.179688	39974.582031	-471.402344	-1.193
C	4.760000	4.854983	-0.104983	-2.206	100318.085938	98129.617188	2188.468750	2.174
D	9.090000	8.587056	0.502944	6.413	175954.703125	188062.250000	-12107.546875	-6.881
E	20.000000	20.478844	-0.478844	-2.354	424438.500000	414659.218750	9779.281250	2.304

CALPLOT Output For Sample File: "C:\DATA\2450.SMP"
Date: 6/8/95 Time: 14:46

Curve Parameters:

Curve #1 : First Order Polynomial Fit
Weighting Factor = 1/x r^2 = 0.997682
Calibration Curve = (495.498877) + (15235.0615231)X



	ug Spiked	ug Recovered	% Recovery
Rec Blk	—	—	—
Rec 1	10.0	10.2	102
Rec 2	10.0	11.0	111

CALPLOT Data Lists For Sample File: "C:\DATA\2450.SMP"
Date: 5/1/95 Time: 05:52

Data Lists With Calculated Values For Each Fit:
Curve #1 : First Order Polynomial Fit
Weighting Factor = 1/x r^2 = 0.997602

Calibration Curve = (495.490877) + (13235.861525)X

Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff.	Observed Y-Value	Calculated Y-Value	Delta	%Diff.
A	0.990000	1.023857	-0.033857	-3.319	16081.829102	15578.246094	503.628011	3.132
B	1.960000	1.959657	0.000343	0.018	30330.984375	30536.216797	-5.232422	-0.017
C	4.760000	4.805765	-0.045765	-0.962	73711.625000	73014.398438	697.234375	0.946
D	9.090000	8.463431	0.626569	6.893	129436.398438	138982.203125	-9545.804688	-7.375
F	21.000000	21.548098	-0.548098	-2.610	328781.968750	320431.781250	8350.187500	2.540

ATTACHMENT 3

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CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

Rm #1

Sample Number: 2-005

Sampler: D. O'Donnell

Date: 4/11/95

Project: Ft. Drum

Pump Number: 15991

PreCalibration Rate: 2,005 cc/minute
Post Calibration Rate: 2,186 cc/minute

Sample Start Time: 0950
Sample Stop Time: 1445
Sample Run Time: _____

Run Time: 355 min. Flow Rate: 2.1 l/min. Total Volume: 745.5 l.
0.7455 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~< 0.01 µg~~ < 10 µg - 2,4,5-T

< 2 µg - 2,4-D

~~< 0.01 µg/m^3 for DDD, DDE, DDT~~

< 13 µg/m^3 - 2,4,5-T

< 3 µg/m^3 - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET RM #2

Sample Number: 2-004 Sampler: D. O'Donnell

Date: 4/11/95 Project: Ft. Drum

Pump Number: 16203

PreCalibration Rate: 1,996 cc/minute
Post Calibration Rate: 2,110 cc/minute

Sample Start Time: 0950
Sample Stop Time: 1448
Sample Run Time: _____

Run Time: 358 min. Flow Rate: 2.0 l/min. Total Volume: 716 l
0.716 m^3

Personal Sample

Name: _____

Address: _____

Social Security No: _____

Phone Number: _____

Perimeter Sample

Sample Locations:

Activity: _____

Sample Results: ~~<0.01 µg~~ <10 µg - 2,4,5-T
~~<2 µg - 2,4-D~~
~~<0.01 µg/m^3~~ <14 µg/m^3 - 2,4,5-T
<3 µg/m^3 - 2,4-D

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CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM#3

Sample Number: 2-001 Sampler: D. O'Donnell

Date: 4/11/95 Project: Ft. Drum

Pump Number: 2259

PreCalibration Rate: 2,008 cc/minute
Post Calibration Rate: 2,166 cc/minute

Sample Start Time: 0951
Sample Stop Time: 1450
Sample Run Time: _____

Run Time: 359 min Flow Rate: 2.1 l/min. Total Volume: 0.754 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~< 1.0 µg - 2,4,5 - T~~

~~< 2 µg - 2,4 - D~~

< 13 µg/m^3 - 2,4,5 - T

< 3 µg/m^3 2,4 - D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

~~RM#3~~ RM #4

Sample Number: 2-003

Sampler: D. O'Connell

Date: 4/11/95

Project: Ft. Drum

Pump Number: 1775

PreCalibration Rate: 1,994 cc/minute
Post Calibration Rate: 2,157 cc/minute

Sample Start Time: 0851
Sample Stop Time: 1452
Sample Run Time: _____

Run Time: 361 min. Flow Rate: 2.1 l/min. Total Volume: 0.758 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~< 10 µg - 2, 4, 5 - T~~

_____

~~< 2 µg - 2, 4 - D~~

_____

< 13 µg/m^3 - 2, 4, 5 - T

< 3 µg/m^3 - 2, 4 - D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM # 5

Sample Number: 2-002

Sampler: D. O'Donnell

Date: 4/11/95

Project: Ft. Drum

Pump Number: 2066

PreCalibration Rate: 2,008 cc/minute
Post Calibration Rate: 2,089 cc/minute

Sample Start Time: 0852
Sample Stop Time: 1455
Sample Run Time: _____

Run Time: 363 min. Flow Rate: 2.0 L/min. Total Volume: 0.726

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~< 10 µg - 2, 4, 5 - T~~

_____

~~< 2 µg - 2, 4 - D~~

< 14 µg/m³ - 2, 4, 5 - T

< 3 µg/m³ - 2, 4 - D

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CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM #1

Sample Number: D004

Sampler: D. O'Donnell

Date: 4/11/95

Project: Ft. Drum

Pump Number: 7397

PreCalibration Rate: 2,007 cc/minute
Post Calibration Rate: 2,173 cc/minute

Sample Start Time: 0850
Sample Stop Time: 1445
Sample Run Time: _____

Run Time: 5hr. 55min (355 min) Flow Rate: 2.1 l/min Total Volume: 745.5 l (0.7455 m3)

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 µg

_____

_____

< 0.01 µg/m3 DDD, DDE, DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET RM #2

Sample Number: D001 Sampler: D. O'Donnell

Date: 4/11/95 Project: Ft. Drum

Pump Number: 10925

PreCalibration Rate: 1,998 cc/minute
Post Calibration Rate: 2,140 cc/minute

Sample Start Time: 0850
Sample Stop Time: 1448
Sample Run Time: _____

Run Time: 358 min. Flow Rate: 2.1 l/min. Total Volume: 0.752 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 ug/

_____

_____

< 0.01 ug/m^3 for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM #3

Sample Number: D003

Sampler: D. O'Donnell

Date: 4/11/95

Project: Ft. Drum

Pump Number: 1763

PreCalibration Rate: 2,005 cc/minute
Post Calibration Rate: 2,050 cc/minute

Sample Start Time: 0851
Sample Stop Time: 1450
Sample Run Time: _____

Run Time: 359 min. Flow Rate: 2.0 l/min. Total Volume: 0.718 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <0.01 µg

_____

_____

< 0.01 µg/m^3 for BBO, DDT, DDE

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM #4

Sample Number: D002 Sampler: D. O'Donnell

Date: 4/11/95 Project: Ft. Drum

Pump Number: 1766

PreCalibration Rate: 2,009 cc/minute
Post Calibration Rate: 2,005 cc/minute

Sample Start Time: 0951
Sample Stop Time: 1452
Sample Run Time: _____

Run Time: 361 min. Flow Rate: 2.0 l/min. Total Volume: 0.722

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 µg/m³

_____

_____

< 0.01 µg/m³ for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM #5

Sample Number: D005 Sampler: D. O'Donnell

Date: 4/11/95 Project: Ft. Drum

Pump Number: 05221

PreCalibration Rate: 2,011 cc/minute
Post Calibration Rate: 2,177 cc/minute

Sample Start Time: 0852
Sample Stop Time: 1455
Sample Run Time: _____

Run Time: 363 Flow Rate: 2.1 l/min. Total Volume: 0.762

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <0.01 µg/

_____

_____

< 0.01 µg/m^3 for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #1

Sample Number: 2-006 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 1763

PreCalibration Rate: 2,008 cc/minute
Post Calibration Rate: 2,020 cc/minute

Sample Start Time: 0740
Sample Stop Time: 1435
Sample Run Time: _____

Run Time: 415 min. Flow Rate: 2.0 l/min. Total Volume: 0.830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~<10 µg - 2,4,5-T~~

~~<2 µg - 2,4-D~~

<12 µg/m^3 - 2,4,5-T

<2 µg/m^3 - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #2

Sample Number: 2-010 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 16203

PreCalibration Rate: 2,023 cc/minute
Post Calibration Rate: 2,042 cc/minute

Sample Start Time: 0742
Sample Stop Time: 1437
Sample Run Time: _____

Run Time: 415 mins Flow Rate: 2.0 l/min. Total Volume: 0.830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 10 µg - 2, 4, 5 - T

< 2 µg - 2, 4 - D

< 12 $\mu g/m^3$ - 2, 4, 5 - T

< 2 $\mu g/m^3$ - 2, 4 - D

(8)

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #3

Sample Number: 2-007 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 1766

PreCalibration Rate: 2,019 cc/minute
Post Calibration Rate: 2,008 cc/minute

Sample Start Time: 0743
Sample Stop Time: 1438
Sample Run Time: _____

Run Time: 415 Flow Rate: 2.0 l/min. Total Volume: 0.830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~< 10 µg/2, 4, 5 - T~~

_____

~~< 2 µg - 2, 4 - D~~

< 12 µg/m^3 - 2, 4, 5 - T

< 2 µg/m^3 - 2, 4 - D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #4

Sample Number: 2-008 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 7397

PreCalibration Rate: 2,010 cc/minute
Post Calibration Rate: 2,057 cc/minute

Sample Start Time: 0744
Sample Stop Time: 1439
Sample Run Time: _____

Run Time: 415 Flow Rate: 2.0 l/min. Total Volume: .830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <10 µg - 2,4,5-T

<2 µg - 2,4-D

<12 µg/m^3 - 2,4,5-T

<2 µg/m^3 - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#5

Sample Number: 2-009 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 7396

PreCalibration Rate: 2,026 cc/minute
Post Calibration Rate: 2,121 cc/minute

Sample Start Time: 0745
Sample Stop Time: 1440
Sample Run Time: _____

Run Time: 415 Flow Rate: 2.1 Total Volume: 0.871

Personal Sample

Name: _____

Address: _____

Social Security No: _____

Phone Number: _____

Perimeter Sample

Sample Locations:

Activity: _____

Sample Results: ~~< 10 µg - 2,4,5 - T~~
~~< 2 µg - 2,4-D~~
< 1 µg/m³ - 2,4,5 - T
< 2 µg/m³ - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #1

Sample Number: D008 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 10925

PreCalibration Rate: 2,018 cc/minute
Post Calibration Rate: 2,053 cc/minute

Sample Start Time: 0740
Sample Stop Time: 1435
Sample Run Time: _____

Run Time: 415 min. Flow Rate: 2.0 l/min. Total Volume: 0.830

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 µg

_____

_____

< 0.01 µg/m³ for DDD, DDE, DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #2

Sample Number: D010 Sampler: D. O'Connell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 05221

PreCalibration Rate: 2,008 cc/minute
Post Calibration Rate: 2,023 cc/minute

Sample Start Time: 0742
Sample Stop Time: 1437
Sample Run Time: _____

Run Time: 415 min. Flow Rate: 2.0 l/min. Total Volume: 0.830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 mg

_____

_____

< 0.01 mg/m^3 for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #3

Sample Number: D009 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 2066

PreCalibration Rate: 2,015 cc/minute
Post Calibration Rate: 2,031 cc/minute

Sample Start Time: 0743
Sample Stop Time: 1438
Sample Run Time: _____

Run Time: 415 min. Flow Rate: 2.0 l/min Total Volume: 0.830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <0.01 µg

_____

_____

<0.01 µg/m^3 for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

#4

AIR MONITORING DATA SHEET

Sample Number: D006

Sampler: D. O'Donnell

Date: 4/12/95

Project: Ft. Drum

Pump Number: 2259

PreCalibration Rate: 2,012 cc/minute
Post Calibration Rate: 2,090 cc/minute

Sample Start Time: 0744
Sample Stop Time: 1439
Sample Run Time: _____

Run Time: 415 min. Flow Rate: 2.0 Total Volume: 0.830 m3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01

_____

_____

< 0.01 mg/m3 for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET #5

Sample Number: D007 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: 1775

PreCalibration Rate: 2,007 cc/minute
Post Calibration Rate: 2,072 cc/minute

Sample Start Time: 0745
Sample Stop Time: 1440
Sample Run Time: _____

Run Time: 415 min Flow Rate: 2.0 l/min. Total Volume: 0.830 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01

_____

_____

< 0.01 µg/m^3 DDD, DDE, DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

Sample Number: 2-011

Sampler: D. O'Donnell

Date: 4/12/95

Project: Ft. Drum

Pump Number: N/A

PreCalibration Rate: N/A cc/minute

Post Calibration Rate: _____ cc/minute

Sample Start Time: N/A

Sample Stop Time: _____

Sample Run Time: _____

Run Time: _____ Flow Rate: _____ Total Volume: _____

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~<10 µg - 2,4,5-T~~

_____

~~<2 µg - 2,4-D~~

_____

<10 µg/m³ - 2,4,5-T

<2 µg/m³ - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM #1

Sample Number: 2-016 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 1836

PreCalibration Rate: 2,005 cc/minute
Post Calibration Rate: 2,012 cc/minute

Sample Start Time: 0800
Sample Stop Time: 1427
Sample Run Time: _____

Run Time: 387 min. Flow Rate: 2.0 l/min. Total Volume: 0.774 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 10 µg - 2,4,5-T

~~< 30 µg - 2,4-D~~

< 13 $µg/m^3$ - 2,4,5-T

< 3 $µg/m^3$ 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

RM #2

Sample Number: 2-013 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 04114

PreCalibration Rate: 2,011 cc/minute
Post Calibration Rate: 2,096 cc/minute

Sample Start Time: 0801
Sample Stop Time: 1425
Sample Run Time: _____

Run Time: 384 min. Flow Rate: 2.0 l/min. Total Volume: 0.768 m^3

Personal Sample

Name: _____

Address: _____

Social Security No: _____

Phone Number: _____

Perimeter Sample

Sample Locations:

Activity: _____

Sample Results: < 10 µg - 2, 4, 5 - T

< 2 µg - 2, 4 - D

< 13 µg/m^3 - 2, 4, 5 - T

< 3 µg/m^3 - 2, 4 - D

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CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#3

Sample Number: 2-012 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Dunn

Pump Number: 7397

PreCalibration Rate: 2,014 cc/minute
Post Calibration Rate: 2,086 cc/minute

Sample Start Time: 0804
Sample Stop Time: 1425
Sample Run Time: _____

Run Time: 381 min. Flow Rate: 2.0 l/min. Total Volume: 0.762

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: ~~<10 µg - 2,4,5-T~~

_____

~~<2 µg - 2,4-D~~

<13 µg/m³ - 2,4,5-T

<3 µg/m³ - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#4

Sample Number: 2-015 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 1775

PreCalibration Rate: 2,057 cc/minute
Post Calibration Rate: 2,098 cc/minute

Sample Start Time: 0810
Sample Stop Time: 1421
Sample Run Time: _____

Run Time: 371 min. Flow Rate: 2.1 lpm Total Volume: 0.779

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <10 µg - 2,4,5-T

<3 µg - 2,4-D

<13 µg/m³ - 2,4,5-T

<3 µg/m³ - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#5

Sample Number: 2-014 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 2066

PreCalibration Rate: 2,008 cc/minute
Post Calibration Rate: 2,062 cc/minute

Sample Start Time: 0811
Sample Stop Time: 1420
Sample Run Time: _____

Run Time: 369 min. Flow Rate: 2.0 lpm Total Volume: 0.738

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <10 µg - 2,4,5-T

_____

<2 µg - 2,4-D

<14 µg/m³ - 2,4,5-T

<3 µg/m³ - 2,4-D

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

Sample Number: D011 Sampler: D. O'Donnell

Date: 4/12/95 Project: Ft. Drum

Pump Number: N/A

PreCalibration Rate: N/A cc/minute
Post Calibration Rate: _____ cc/minute

Sample Start Time: N/A
Sample Stop Time: _____
Sample Run Time: _____

Run Time: _____ Flow Rate: _____ Total Volume: _____

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 mg/

_____

_____

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#1

Sample Number: D013 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 1766

PreCalibration Rate: 2,006 cc/minute
Post Calibration Rate: 2,001 cc/minute

Sample Start Time: 0800
Sample Stop Time: 1427
Sample Run Time: _____

Run Time: 387 min. Flow Rate: 2.0 l/min. Total Volume: 0.774 m^3

Personal Sample

Name: _____

Address: _____

Social Security No: _____

Phone Number: _____

Perimeter Sample

Sample Locations:

Activity: ~~to~~

Sample Results: <0.01 ~~ug~~

<0.01 $\mu g/m^3$ for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#2

Sample Number: D012 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 1763

PreCalibration Rate: 2,006 cc/minute
Post Calibration Rate: 2,029 cc/minute

Sample Start Time: 0801
Sample Stop Time: 1425
Sample Run Time: _____

Run Time: 384 min. Flow Rate: 2.0 l/min Total Volume: 0.768 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 µg

_____

_____

< 0.01 µg/m^3 for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#3

Sample Number: D016 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 10925

PreCalibration Rate: 2,032 cc/minute
Post Calibration Rate: 2,141 cc/minute

Sample Start Time: 0804
Sample Stop Time: 1426
Sample Run Time: _____

Run Time: 381 Flow Rate: 2.1 l/min Total Volume: 0.800 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: <0.01 µg

_____

_____

<0.01 µg/m^3 for DDD, DDE, DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#4

Sample Number: D014 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 05221

PreCalibration Rate: 2,007 cc/minute
Post Calibration Rate: 2,062 cc/minute

Sample Start Time: 0810
Sample Stop Time: 1421
Sample Run Time: _____

Run Time: 371 min. Flow Rate: 2.0 l/mn. Total Volume: 0.742 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01

_____

_____

< 0.01 $\mu g/m^3$ for DDD, DDE, and DDT

CDM FEDERAL PROGRAMS CORPORATION

AIR MONITORING DATA SHEET

#5

Sample Number: 0015 Sampler: D. O'Donnell

Date: 4/13/95 Project: Ft. Drum

Pump Number: 16203

PreCalibration Rate: 2,076 cc/minute
Post Calibration Rate: 2,075 cc/minute

Sample Start Time: 0811
Sample Stop Time: 1420
Sample Run Time: _____

Run Time: 369 min Flow Rate: 2.1 L/min Total Volume: 0.775 m^3

Personal Sample

Name: _____

Address: _____

_____

_____

Social Security No: _____

Phone Number: _____

Perimeter Sample

_____

_____

_____

Sample Locations:

_____

_____

_____

Activity: _____

_____

_____

Sample Results: < 0.01 µg

_____

_____

< 0.01 µg/m^3 DOD, DOE, and DOT